REASONING & APTITUDE

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~~CRAZY COOL AMBITIOUS~~

:)

~~06/06~~

06/06

Best day for me :D.

Topic	Page #

UNIT - IST CALENDAR

1 - week = 7 - days

⇒ **odd Day :→** # of day in Reminder when we divide all day by '7' (seven).

Ex: ① No. of odd day in 10 days.

(A) 1
(B) 2
(C) 3
(D) 0

Soln :- ① 10 days : 1 week + 3 days

7) 10 (1-week
7
3-day ← odd day

Soln ② 10 % 7 = 3 - odd days.

Ex-② No. of odd days in 93 - days -

(A) 1 (B) 2 (C) 3 (D) 4

Soln ① 7) 93 (13-week
91
2-day ← odd day

Soln ② 93 % 7 = 2-day
↑ odd-day.

Ex-③ No. of odd day in 365 - days

(a) 1 (b) 2 (c) 3 (d) 4

Soln :- 7) 365 (52-week
35
15
14
1-day ← odd day.

Soln ① 365 % 7 = 1-day
↑ odd

Types of year :- 2 types.

① ordinary year = 365 day
No. of odd day = 1
febuary = 28

② Leap year = 366 days
# of odd day = 2
febuary = 29

⇒ Leap year :

Note :- ① It must divisable by 4 . It comes even 4-year as- 1988, 1992, 1996 ..... 2004, 2008, 2012, 2016 etc year -

② Begining of a centuary is a leap year : It must be divisable by 400.

It comes even 400 years -

400, 800, 1200, 1600, 2000, 2400, 2800 ---

2000 ↓ Leap year at in which we lives.

Ex: No. of odd days in 75 -days -

(a) 5 (b) 3 (c) 1 (d) 0

Soln: 75 % 7 = (5-day) ← odd.

Ex- No. of odd days in 75 years -

(A) 1 (B) 3 (C) 2 (d) 7

Soln :-

75 year

No. of ordinary year ⇓ 57 ⇓ 57 * 1 = 57 day

75 year - 18 ← Leap = 57

No. of Leap years. ⇓ 18 ⇓ (18 x 2) = 36 day

Leap year = 75/4 = 18

(57 + 36) day = 93 day ⇒ 7 | 93 | 13-week
91
2-day
odd day.

Ex → No. of odd days in 84 years –

(A) 0 (B) 2 (C) 3 (D) 4

84 years

Ordinary year ⇓ 63 ⇓ 63 × 1 ⇒ 63 day

84/21 → 63 → leap

Leap year ⇓ 21 ⇓ (21 × 2) = 42 days

84/4 = 21

(63 + 42) = 105 – day

∴ No of odd day = 105 % 7 = 0

7 | 105 (15-week
7
35
35
0-day

Ex – No. of odd day in 100 years – ⇒ Ans ⇒ 5-odd days

100 year

ordinary year Leap-year

1, 2, 3, 4 ..... 98, 99, 100

100/4 = 25 ✗ wrong

400 | 100 (0
0
100

100th → 1-century includes → so that 100th year is not leap year.

4 | 99 (24 → leap year.
96
3

ordinary year ⇒ 99 – 24 = 75

= 75 + 1 = 76 → for 100th year.

ordinary year ⇓ 76 ⇓ 76 × 1-day = 76-day

Leap year ⇓ 24 ⇓ 24 × 2 = 48 day.

(76 + 48) = 124-day ⇒ 7 | 124 (17-week
7
54
49
5-day ⇒ odd day.

or Odd day = 124 % 7 = 5-day.

⇒ **No. of odd days in x-year = $x + \frac{x}{4}$**

⇓

Note: only valid if it not contain centuray.

⇒ Ex: No. of odd day in 75 year -

⇒ $75 + \frac{75}{4}$ ⇒ 75 + 18 = 93-day = 2-day

7 | 93 (13-week
91
2-day ← odd day

$\frac{x}{4}$: leap year

$\frac{75}{4}$ = 18 leap.

$\frac{84}{4}$ = 21

$\frac{3}{4}$ = 0

Ex: No. of odd day in 56-year -

$= 56 + \frac{56}{4} = 56 + 14 = 70$-day = 0-day

70 ⇒ 0-day odd

7 | 70 (10 week
70
0-day ← odd.

correct bcoz centuray year div. by 400 (Here not div so 100th year is ordinary.

$\frac{100}{4}$ = 24 leap year

$\frac{100}{4}$ = 25 leap year

✗ bcoz 100th div by 400

⇒ Ex:- No. of odd-day in 100 year -

It hides some thing please try to concentrate

$= 100 + \frac{100}{4}$

$= 100 + 24 = 124$

⇒ 5-day

7 | 124 (-17-week.
119
5-day ← odd

⇓

(How & what → 100th year ordinary bcoz of not div. by 400)

⇒ Ex- No. of odd day in 126 year -

= 100 year + 26 year

⇓

5-day + 26 + $\frac{26}{4}$

↑ # of odd-day in 100 year.

= 5 + 26 + 6 ⇒ 37-day ⇒ 37%7 = 2-day

∴ odd day = 2-day Ans

7 | 37 (5-week
35
2-day ← odd

If we used direct $126 + \frac{126}{4}$ ✗ ↑ Isurrong

⇒ Ex-(12) No. of odd day in 149 year

$= 100 + 49 + 49/4$

$= 5\text{-day} + 49 + 12$

$= 66\text{-day} \Rightarrow 3\text{-day} \leftarrow$ odd day.

7 | 66 | 9-week
63
3-day ← odd day.

Note: →(1)

(1) In every 100 year No. of odd day = 5-day.
(2) In " 200 " = 3-day (10 day)
(3) In " 300 year " " = 1-day (15-day)
(4) In " 400 year " " = (20+1) day
= 21-day = 0-odd day

↑ Most memorable formula

best in 400 year 4-century so one leap year extra.
best div by 400.

} Leap year ⇒ ~~Feb~~ Feb = 29-day }

Note-(2) In every 800 year # of odd day = 0
" " 1200 " = 0
" " 1600 " = 0
" " 2400 " = 0
and so-on.

Ex- No. of odd day in 600 year-

Sol^n- 600 year = 400 + 200

= 0 + 3 = 3-day ⇒ 3-odd day.

Ex- No. of Odd day in 1100 year-

Sol^n- 1100 year ⇒ 800 year + 300 year

= 0 + 1-day = 1-day (odd) Ans

Ex → No. of odd day in 1700 year-

Sol^n: 1700-year = 1600 + 100

= 0 + 5 ⇒ 5-day Ans (5-odd day)

Ex- No. of odd day in 3000 years -

Sol^n: - 3000 year $\Rightarrow$ 2800 + 200 year = 0 + 3 $\Rightarrow$ 3-odd days.

(2800 $\Downarrow$ 0, 200 $\Downarrow$ 3-odd)

Ex - No of odd day in 2009 year -

Sol^n 2009 year = 2000 + 9 year

$= (0 + 9 + 9/4)$ day $= 9 + 2 = 11$-day

$\therefore$ 11%.7 = 4 = odd day

7) 11 (1-week
7
4-day ← odd.

$\Rightarrow$ Ex: No. of odd day in 1947 year -

Sol^n 1947 year = (1600 + 300 + 47) year

$(0 + 1 + 47 + 47/4)$

$= 0 + 1 + 47 + 11 \Rightarrow 59$-day.

$\therefore$ # of odd day = 59%.7 = 3-day

↑ odd

7) 59 (8-week
56
3-day
↑ odd.

$\Rightarrow$ Ex- No. of odd day in 846 year

$= 800 + (46 + 46/4)$

$= 0 + 46 + 11 \Rightarrow 57$-day

$\therefore$ # of odd days = 57%.7 = 1-odd day

7) 57 (8-week.
56
1-day
↑ odd-day.

$\Rightarrow$ Note:- (1)

With -no- reference given in problem -

If we found / get # of odd day as

0-odd days	$\Rightarrow$	SUNDAY
1- " "	$\Rightarrow$	MONDAY
2- " "	$\Rightarrow$	TUESDAY
3- " "	$\Rightarrow$	WEDNESDAY
4- " "	$\Rightarrow$	THRUSDAY
5- " "	$\Rightarrow$	FRIDAY
6- " "	$\Rightarrow$	SATURDAY

Note-②

Ordinary year = 365

No. of odd day = 1

2010, 2011, 2013, 2014

Leap year = 366 day

No of odd day = 2 ← odd day.

2008, 2012, 2016

No of odd day

Ordinary years

Month	# of Day	# of odd day
Jan	31	3
Feb	28	0
March	31	3
April	30	2
May	31	3
June	30	2
July	31	3
Aug.	31	3
Sept	30	2
Oct	31	3
Nov	30	2
DEC.	31	3

Leap year.

Month	# of Day	# of odd day

Note:→ only feb contain # of Day's = 29-day.

so in feb = # of odd day = 29%7 = 1

1-day → odd.

other month are same for leap as ordinary.

Ex: 16th-Oct-2010 is

(a) Saturday (b) Sunday (c) Monday (d) Wednesday.

Sol^{n} → 2009 → years completed.

So. # of odd day

(2000 + 9) year

(0 + 9 + 9/4) = 11-day

11%7 ⇒ 4-day-odd.

(2010) → Running year.

Jan = 31 = 3 | July = 31 = 3

Feb. = 28 = 0 | Aug. = 31 = 3

Mar. ⇒ 31 = 3 | Sep ⇒ 30 = 2

Ap. ⇒ 30 = 2 | Oct = 16 = 2-day

May. ⇒ 31 = 3 | 16%7 ⇒

June ⇒ 30 = 2 | 23-day

⇒ 3+0+3+2+3+2+3+3+2+2 = 23-day

∴ 4+23 = 27-day odd

⇒ 27%7 = 6-day odd

∴ 6-days odd means saturday Ans

⇒ Ex-(21) 22nd July 1992 was-

Sol^n- 1991 years completed

1991 years = 1600 + 300 + (91 + 91/4)

= 0 + 1 + 91 + 22 ⇒ 114

# of odd Day = 114 % 07 = 2-day-odd

7 | 114 | 16-week
7
44
42
2-day

1992 is running year-

↓

Leap year → Feb included-

~~Jan Feb March Jun July~~

Jan Feb. Mar. Ap. May. June July.

↓ ↓ ↓ ↓ ↓ ↓ ↓

3 + 1 + 3 + 2 + 3 + 2 + (22/7 = 1)

= 15-odd days

∴ # of total odd day : 2+15 = 17-day

7 | 17 | 2-week
14

3-day ← odd

∴ 3-day odd mean Wednesday.

So 22nd-July 1992 was Wednesday.

⇒ Ex:- 16th March 1996 - day-

(a) SUNDAY (b) Monday (c) Tuesday (d) friday (e) Nod.

Sol^n:- 1995 years completed

(1995) years = (1600 + 300 + 95) years

(0 + 1 + 95 + 95/4) day odd

= 1 + 95 + 23 = 119 - odd day

⇒ 7 | 119 | 17-week.
119
0 - odd day

Leap year (Feb) - include

1996 - is running year

Jan Feb March

↓ ↓ ↓

3 + 1 + (16 % 07 = 2)

⇒ 6 - odd day

∴ total # of odd day = (0+6) % 07 = 6-odd day

Saturday. Ans

⇒ Ex:- 16th-Oct 2010 is saturday then 16th oct 2011 is -

Sol^n:- ↓ 1-years (ordinary year)

No-of odd day = 1 ⇒ Sat + 1 ⇒ Sunday Ans

Q ⇒ 16th oct -2010 is saturday the 16th oct 2008 - was - ?

(in 2008 - leap-year but febuary excluding)

↓

But excluding

Sol^n:- 16th Oct -2010 ⇒ 16th Oct -2008

↳ 2 year.

{ leap = 0
ordinary = 2 }

No. of odd day = 2

SAT - 2 = Thursday ✓

⇒ Ex- between ↳ 3rd January 2000 to 3rd January 2003 { → feb included → No of odd days. ⇒ 3-year.

leap year : 1 = 2-odd day.

ordinary = 2 ⇒ 2-odd day

No. of odd day = 2+2 = 4-odd day.

(A) 4 (B) 3 (C) 2 (D) 1

⇒ Ex: 15th Aug. 2010 is sunday then 15th Aug. 2025 is -?

Sol^n:- 15th Aug 2010 to 25th Aug 2025 -

⇓

15 -year

{ leap year ⇒ 4
ordinary year = 11 }

∴ No. of odd day ⇒ 11 + 4×2 = 19-day

⇒ 7) 19 (2
14
5-day

⇒ sunday + 5-day ⇒ Friday.

⇒ Ex: 5th January 1991 was saturday then 3rd march 1992 was -?

Sol^n:- 5th Jan -1991
5th Jan -1992 } → 1-year completed → that ordinary.

No. of odd day = 1

1992 → leap year ⇒ after completed Jan 5th -

feb = 29 ⇒ 1 odd day

March = 3 – odd day.

9 ⇒ (2) odd day.

∴ Saturday + odd day ⇒ saturday + 1 + 2

= Tuesday. ✓

Note:- ② we will take '-ve' if we go in previous we take +ve if we are finding next.

① we will take '-ve' odd day (I mean subtract from given day. If we go in past or earlier year.

② If we will go in next mean upcoming year then we add the odd day or '+ve' day from with given day

Ex:→ No. of friday in august -1988.

(A) 4 (B) 5 (C) 6 (D) 3.

Sol^{n}:- first we will find day for 1st August -1988.

1987 years completed.

= (1600 + 300 + 87) years

(0 + 1 + 87 + 87/4) odd day

= 109 ⇒ 109/07 = 4-day odd.

(1988) is running year

↳ leap feb- included.

J – 31 = 3	M – 31 = 3
F – 29 = 1	J = 30 = 2
M – 31 = 3	J = 31 = 3
A → 30 = 1	Aug: 1st = 1
	18

∴ 4 + 18 = 22-day ⇒ 22/7 ⇒ 1-day (odd)

∴ 1-odd day → mean monday

friday (5) + odd day. ⇒ ∴ friday = 5, 12, 19, 26

∴ 1st Aug. Monday

2nd — Tues —

3rd — wed.

4th → Thrus.

5th → Friday

so (4) fri friday Ans

Ex: No. of Saturday in Dec 2002

↓ Feb included

leap years.

Sol^{n}:- 1999 years completed

1999 years $\Rightarrow$ (1600 + 300 + 99) years

$= (0 + 1 + 99 + 99/4)$ odd day

$= 124 \Rightarrow 124\%7$

$\Rightarrow$ 5-day odd.

2000th Running year

↳ leap as well as feb included.

Jan	→ 31 ⇒	3
Feb	→ 29 ⇒	1
Mar	→ 31 →	3
April	→ 30 →	2
May	→ 31 →	3
Jun	→ 30 →	2
July	→ 31 →	3
Aug	→ 31 →	3
Sept	→ 30 →	2
Oct	→ 31 →	3
Nov	→ 30 →	2
1st — Dec.	→ 1 →	1
		28-day

∴ #y odd day on 1st Dec = (5+28)%7 = 5-odd day.

∴ 5-odd day mean Friday.

∴ 1st saturday

∴ If 1st Dec. 2002 is a friday then 2nd-Dec=2002 is saturday

∴ Saturday = Dec → 2nd, 9, 16, 23, 30

∴ #y saturday = 5 Ans

UNIT-2 # NUMBER SYSTEM

① Number system :-

① Prime Numbers :- 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97 etc.—

② Prime No. :- No. which not divisable by any number other then 0, 1 and itself.

③ composite No. :- 4, 6, 8, 9, 10 ----

Note :- '1' is neither composite nor prime #.

factor of 1 → 1

factor of 2 → 1, 2 → prime #

factor of 3 → 1, 3

factor of 4 → 1, 2, 4 → composite #

factor of 15 → 1, 3, 5, 15 ⇒ 4

#- means Number

#of fact = 4
#of prime fact = 2 (3, 5)
No of different prime fact = 2

⇒ $15 = 3^1 * 5^1$

→ If N = Given Number

$N = a^p * b^q$ ⇒ p, q = powers
a, b = factor

then #of factor = $(P+1)(Q+1)$

Ex: 15 ⇒ fact of 15 = 1, 3, 5, 15 ⇒ 4.

$15 = 3^1 * 5^1$ ⇒ #of factor = $(P+1)(Q+1)$

$P = 1, Q = 1$

$= (1+1)(1+1) = 4$ Ans

(Ex) No. of factor of 60 (a) 12 (b) 16 (c) 18 (d) 20

Sol^n $60 = 2\times2\times3\times5 \Rightarrow N = 2^2 * 3^1 * 5^1$

If $N = a^p * b^q * c^r \Rightarrow$ then # of factor $= (p+1)(q+1)(r+1)$

$= p=2, q=1, r=1$

$\therefore$ # of factor $= (2+1)(1+1)(1+1)$

$= 3*2*2 = 12$

No. of factor = 12

No. of prime factor = 4

No of different prime factor = 4

No. of factor = 12

1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60

→ Ex - No. of factor in 9009

(a) 36 (b) 24 (c) 48 (d) 20

Sol^n

(1)	3	9009
(2)	3	3003
(3)	7	1001
(4)	11	143
		13

(5) ← prime factor

$\Rightarrow 9009 \Rightarrow 3^2 * 7^1 * 11^1 * 13^1$

$= (2+1)(1+1)(1+1)(1+1)$

$= 3*2*2*2 = 24$ factor

$\therefore$ No. of factor = 24

No. of prime factor = 5

No of diff. prime factor = 4

⇒ Ex No. of factor in 1800 →

(1)	2	1800
(2)	2	900
(3)	2	450
(4)	3	225
(5)	3	75
(6)	5	25
(7)		5

(1) (2) (3) → diff. prime factor.

$\Rightarrow 1800 = 2^3 * 3^2 * 5^2$

$= (3+1)(2+1)(2+1)$

$= 36$

No. of factor = 36

No of prime factor = 7

No. of different prime factor = 3

Q.: No. of prime factors of $(30)^7 * (22)^5 * (34)^{11}$

(a) 23 (b) 43 (c) 63 (d) 53

$\Rightarrow (30)^7 = (2*3*5)^7 = 2^7 * 3^7 * 5^7 = 21$

$(22)^5 = (2*11)^5 = 2^5 * 11^5 = 10$

$(34)^{11} = (2*17)^{11} = 2^{11} * 17^{11} = 22$

53

No of prime factor = 53

$\Rightarrow 4! = 2^3 * 3 * 1$

Power of p in $n!$ $= \left(\frac{n}{p^1}\right) + \left(\frac{n}{p^2}\right) + \left(\frac{n}{p^3}\right) + \cdots$

(take always integer value ignor fractional)

Ex – power of 2 in 4!

$= \frac{4}{2^1} + \frac{4}{2^2} + \frac{4}{2^3} + \cdots$

$= 2 + 1 + 0 \Rightarrow 3$ Ans

(when we get some value after point then we drop the point (decimal & only integer value), use only integer value)

Ex- Power of 3 in 4! $= \left(\frac{4}{3^1}\right) + \left(\frac{4}{3^2}\right) + \cdots$

$= 1 + 0 \Rightarrow$

$\Rightarrow 1$ Ans

Ex: power of 3 in 18!

$\Rightarrow \frac{18}{3^1} + \frac{18}{3^2} + \frac{18}{3^3} + \cdots$

$= 6 + 2 + 0 + \cdots$ 8

Ex power of 3 in 80!

$\Rightarrow 80/3^1 + 80/3^2 + 80/3^3 + 80/3^4 + \cdots$

$\Rightarrow 26 + 8 + 2 + 0 = 36$ Ans

Ex→5 Power of 7 in 90!

$= (90/7^1) + (90/7^2) + (90/7^3) + \cdots$

$= 12 + 1 + 0 = 13$ Ans

DIVISION RULE

D

d ← 8) 42 (5 → Q

40

2 ↑ R

D = dividint
d = divisor
Q = Quetient
R = Reminder.

$D = d \times Q + R$ ⇒ $42 = 8 \times 5 + 2$

	Smallest No.	Greatest No.
with 4-digit	1000	9999
5-digit ⇒	10000	99,999
6-digit ⇒	1,00,000	999,999

Ex ① what is the ~~greatest~~ greatest number of 5-digit No. exactly divisable by 231

99,999 (-24) → The (-x) means x is reminder and remove it from a n-digit ~~no~~ greatest No. after division
231

231) 99,999 (432
924
759
693
669
462
207 ← Reminder = x ⇒ 99,999
-207
99792 → Ans

this No. exactly div. by 231
And it greatest 5-digit #

Ex- ~~Greatest~~ Greatest # of 3-digit divisable by 12

(a) 999 (b) ~~996~~ (c) 997 (d) 998

12) 999 (83
96
39
36 (3) → Reminder

⇒ 999
-3
996 Ans

Q:→ What is the least smallest # of 6-digit # which is exactly divisable by 175

D

175 | 100000 | 571 - Q

d ← 175

875

1250

1225

250

175

75 ← R

∴ smallest No. = least + (d - R)

= 100000 + (175 - 75)

= 100100 Ans

⇒ So only two thing -

→ R → for greatest

+ → (d - R) for smallest

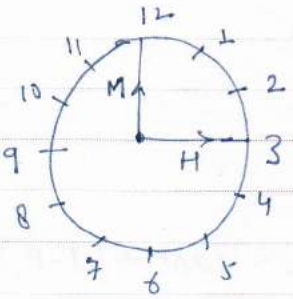
Note:- for

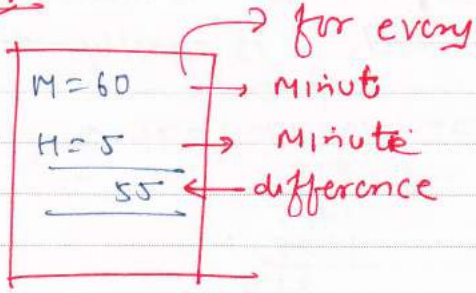
① greatest # = bigest - R

② Smallest # = ~~smallest~~ least + (d - R)

R → Reminder.

⇒ CLOCK ⇒





Note:- (1) In every 1-Hour minute Hand passes over 60 minutes spaces.

(2) In every 1-Hour; Hour Hand passes over 5-minute-spaces.

So-gain :⇒ Minute hand given $60-5 = \boxed{55}$ -minute

→ Now 55 minute space gain in 60-minute

15 minute gain " " 1' $= \frac{15}{55} \times 60$

Note: distance b/w minute & Hour Hand $= \frac{15 \times 12}{11}$ minute

on 1 'O'clock $= \frac{5 \times 12}{11}$

2'O clock = $\frac{10 \times 12}{11}$

3'O clock = $\frac{15 \times 12}{11}$

4'O clock = $\frac{20 \times 12}{11}$

5'O clock = $\frac{25 \times 12}{11}$

6'O clock = $\frac{30 \times 12}{11}$

7'O clock = $\frac{35 \times 12}{11}$

8'O clock = $\frac{40 \times 12}{11}$

9'O clock = $\frac{45 \times 12}{11}$

10'O clock = $\frac{50 \times 12}{11}$

11'O clock = $\frac{55 \times 12}{11}$

12'O clock = $\frac{0 \times 12}{11}$

$M = 6^\circ$ → for every one minute

$H = \frac{1}{2}^\circ$

diff $\Rightarrow 5\frac{1}{2}^\circ$

Note:-

M → minute Hand

one round = 1 hour = 60 minute

one round = 360°

60 min = 360°

1 - minute = $\frac{360}{60}$

$= 6^\circ$

H → Hour Hand -

one round = 12 Hour

12 Hour = 360

1 Hour = $\frac{360}{12} = 30^\circ$

60 minute $\Rightarrow 30^\circ$

1 - HOUR

$\therefore$ 1 minute = $\frac{30}{60} = \frac{1}{2}^\circ$

for 1 minute Hour Hand

⇒ Position of Hand :-

① Co-incide (togithus) $= 0^\circ$

② Right angle $= (90^\circ)$

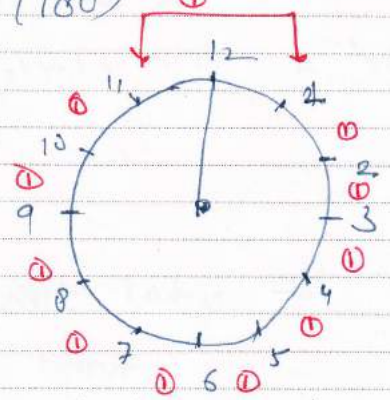
③ opposite to each other (180°)

① Co-incide (Togethus)

Hands of the clock ~~co-in~~ co-incide once in every 1-HOUR

But 11 - time in 12-HOUR

22 - times in 24-HOUR



Ex:→ At what time b/w 3'o clock & 4'o clock Hands of clock to be togithus -

(A) 3:15 $\frac{4}{11}$

(B) 3:16 $\frac{4}{11}$

(C) 3:17 $\frac{4}{11}$

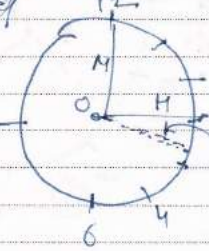
(D) 3:18 $\frac{4}{11}$

3+
4−

Soln: Exactly 3'o-clock

15 minute space apart

To coincide minute ~~Hand~~ Hour Hand has to gain 15 minute space



we know that -

55 minute space gain in 60 minute

15 ——— $\frac{15 \times 60}{55} = 15 \times \frac{12}{11} = \frac{180}{11}$

Required time

$= 16\frac{4}{11}$

Required time = gain $\times \frac{12}{11}$ → Here gain = 15

$\therefore$ RT = $15 \times \frac{12}{11} = \frac{180}{11} = 16\frac{4}{11}$

$\Rightarrow 3:16\frac{4}{11}$ Hour Ans

Ex- At what time B/W ~~7 and 8~~ ~~clock~~ 7 'o clock & 8-o'clock hand of clock will be together —

Soln- ↳ gain = 35

R·T = $35 \times \frac{12}{11} = \frac{420}{11} = 38\frac{2}{11}$

$= 7: 38\frac{2}{11}$ Hour.

Ex- At what time B/W 11'o clock and 12'o clock Hand of clock will together —

Soln → 11'o clock gain = 55 $\Rightarrow 55 \times \frac{12}{11} = 60^\circ = 0$ Hour $= 12$ Hour

1 Hour

$\therefore 11 + 1 = 12:00$ Hour —

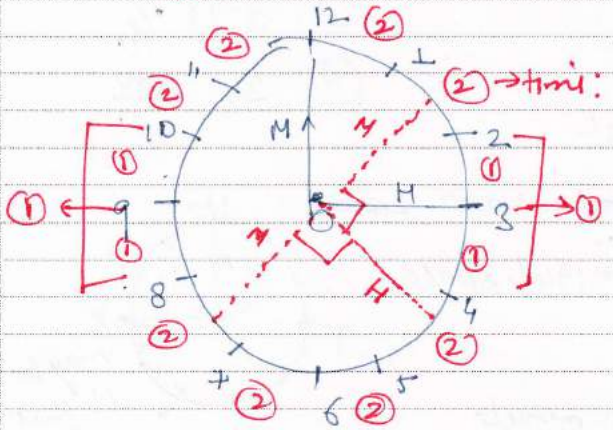
12:00 o'clock

(2) At what time B/W 12'o clock and 1'o clock hand of clock together ∵ gain = 0

RT = $0 \times \frac{12}{11} \Rightarrow 0$

$\therefore$ 12 + 0 = 12: o'clock

⇒ Right Angles:- (90°):-



⇒ Right angle b/W 4 & 5'o clock approx - 'Red pen' dotted line.

① 4:05 ①

② 4:35 ②

B/W 2 to 4-o'clock 3-Right angle.

B/W 8 to 10-o'clock 3 ——.

9- is exactly Right Angle.

Total Right angle = 8 × 2 = 16

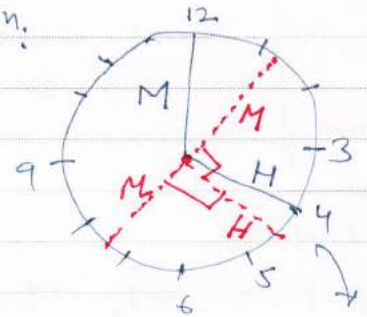
Total Right angle in 12-Hour → +3+3 = 6 → 22

Note:- ① Hand of clock at Right angle Twice in every 1-HOUR

But ——— 22-time in 12 HOUR
44-time in 24-HOUR

Ex: ① At what time b/w 4'O.clock and 5 'O-clock hands of clock in right angle-

Soln:



(A) $4:5\frac{5}{11}$
(B) $4:38\frac{2}{11}$
(C) $4:5\frac{10}{11}$
(D) $4:38\frac{7}{11}$
(E) Non.

on exactly 4-O'clock 20-minut space apart

Gain $= 20 - 15 = 5$ ← difference b/w gain for Right angle

$R.T = 5 * \frac{12}{11} = \frac{60}{11}$

$5\frac{5}{11}$

$\therefore$ ① $4:5\frac{5}{11}$ ← 1st one

gain $= 20 + 15 = 35°$

$= 35 * \frac{12}{11} = \frac{420}{11}$

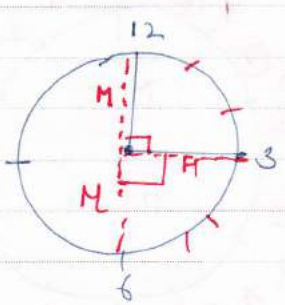
$= 38\frac{2}{11}$

② $4:38\frac{2}{11}$ ← 2nd one

These two Right angle.

② At what time b/w 3'O-clock & 4-O'clock Hand of the clock on the Right angle-

Solve:-



Soln At 3'O clock
↳ 15-minut space apart

gain $= 15 - 15 = 0$

$RT = 0 * \frac{12}{11} = 0$

$= 3:00 + 0$

$= 3:00$

gain $= 15 + 15 = 0$

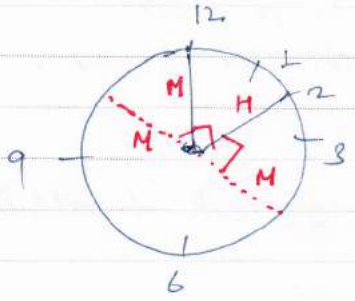
$R.T = 30 * \frac{12}{11}$

$RT = \frac{360}{11}$

$3:32\frac{8}{11}$

only one Right angle.
b/w 3 & 4.

⇒ Ex→(3) At what time b/w 2'0-clock and 3'0 clock Hand of the clock on @ Right Angle –



Sol^{n}→ At 2'0-clock

$\frac{11}{10}$ minute space apart

gain = 10+15 = 25

= −5 + 60

= 55

RT ⇒ $55 * \frac{12}{11}$

⇒ 60 ⇒ 1 Hour

Useless ⇒ 2+1

= 3-0'clock

gain = 10+15 = 25

RT = $25 * \frac{12}{11} = \frac{300}{11}$

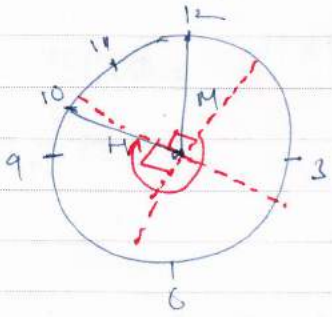
$= 27\frac{3}{11}$

⇒ 2 : $27 * \frac{3}{11}$

(4) At what time b/w 10'0-clock & 11-0'clock hand of clock on Right Angle –

at exactly 10-0'clock –

↳ 50 minute space apart



gain = 50 − 15 = 35

RT = $35 * \frac{12}{11}$

$= 10 : 38\frac{2}{11}$ ①

gain = 50 + 15 = 65 : 5

RT = $5 * \frac{12}{11} = 60/11$

$= 5\frac{5}{11}$

∴ $10 : 5\frac{5}{11}$ ②

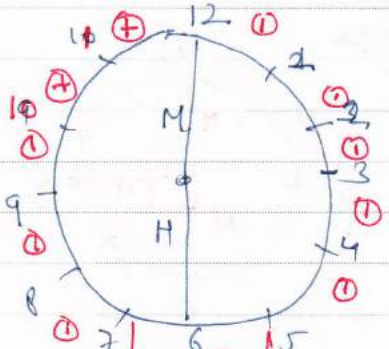
Two Right angle

⇒ ⇒ opposit to each other :⇒ (180°)

↳ Hand of clock opposite to each other once in every 1 HOUR

But in 11-time in 12-HOUR

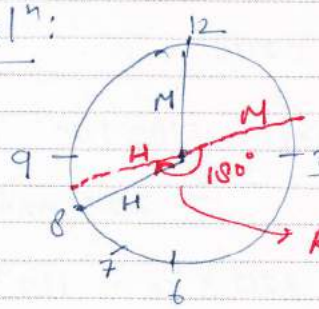
22-time in 24-HOUR



Never be opposite b/w 6/7 and 5, 6 but exactly 6 these are opposite –

Ex: At [illegible] clock, Hand of clock opposite to each other.

Sol^n:



Roughly idea

Sol^n ⇒ At 8-o'clock 40 minute space apart.

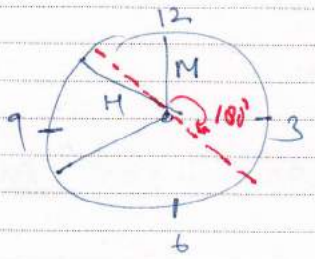
gain = 40 − 30 = 10

RT = $10 \times \frac{12}{11}$ = $\frac{120}{11}$ = $10\frac{10}{11}$

gain = 40 + 30 = 70 = 10

∴ 8 : $10\frac{10}{11}$ Hours.

Ex:- At what time b/w 11'o-clock & 12'o clock Hand of clock opposite to each other.



Sol^n → At 11'o-clock → 55 minute space apart

gain = 55 − 30 = 25

R-T = $25 \times \frac{12}{11}$ = $\frac{300}{11}$ ⇒ $27\frac{3}{11}$

55 + 30 = 85 ⇒ 25

= 11 : $27\frac{3}{11}$ Hour.

⇒ ANGLE of CLOCK's :

① Eg: Angle at 5:20

minute Hand ← M → 20 minute = 20 × 6° = 120°

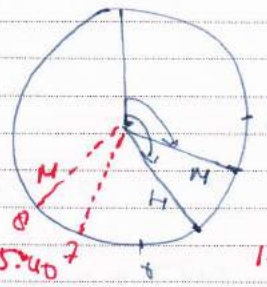
Hour Hand ← H → 5:20

5 × 60 = 300 minute

= 300 + 20 minute

= 320 × ½°

= 160°



1 - Hour = 30°

5 - Hour = 5 × 60 = 300 minute

+20

320

∴ Angle b/w Hands of clock = 160 − 120 = 40°

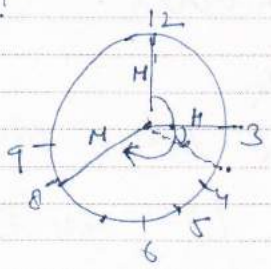
Note: always calculate greater - smaller so angle will be +ve always.

M = 6° for every minute

H = ½°

ex: at 3:40 angle between hour & minute hand of clock =

Sol^n.



Sol^n minute hand

[M] $\Rightarrow$ 40 minute

$= 40 * 6 = 240^\circ$

[H] $\rightarrow$ Hour Hand $\Rightarrow 3 * 60 = 180 + 40^\circ$

$= 220$ minute

$Ang = 220 * \frac{1}{2}^\circ = 110^\circ$

$\therefore$ Angle b/w hands of clock $= 240 - 110$

$= 130^\circ$ Ans

$\Rightarrow$ Ex: Angle at 9:45

Minute Hand [M] $\Rightarrow 45 * 6 = 270^\circ$

Hour Hand [H] $\Rightarrow 9 * 60 + 45 = 540 + 45 = 585$ minute

$= 585 * \frac{1}{2}^\circ = 292\frac{1}{2}^\circ$

$\therefore$ Angle $= 292\frac{1}{2}^\circ - 270^\circ = 22\frac{1}{2}^\circ$ Ans

$\Rightarrow$ Ex (4) 1:23 O'clock Angle.

[M] $\rightarrow$ 23 minute $\Rightarrow 23 * 6^\circ = 138^\circ$

[H] $\Rightarrow 1 * 60 + 23 \Rightarrow 60 + 23$ minute $= 83^\circ \Rightarrow$ angle $= 83 * \frac{1}{2}^\circ$

$= 41\frac{1}{2}^\circ$

$\therefore$ Angle $= 138 - 41\frac{1}{2} = 96\frac{1}{2}^\circ$ Ans

Ex (5) On 2:$3\frac{7}{11}$ O'clock Angle is ?

[M] $\rightarrow 3\frac{7}{11} \Rightarrow \frac{40}{11} * 6 = \frac{240}{11}^\circ$

[H] $2 * 60 + \frac{40}{11}$ minute $= \frac{1360}{11}$ $\therefore$ Angle $= \frac{1360}{11} * \frac{1}{2}^\circ = \frac{680}{11}^\circ$

$\therefore$ Angle $= \frac{680}{11} - \frac{240}{11}^\circ = \frac{440}{11} \Rightarrow 40^\circ$ Ans

Ex: At what time b/w 2'o-clock and 3'o-clock Hands of clock will be 40^0-

(a) $2:18\frac{2}{11}$ (b) $2:17\frac{2}{11}$ (c) $2:14\frac{2}{11}$ (d) $2:16\frac{2}{11}$

Sol^n:

Formula's ⇒ $\boxed{RT\ (Required\ time) = \frac{2}{11}(30x \pm A)}$

x : initial time

A = given angle-

$RT = \frac{2}{11}(30 \times 2 \pm 40)$

$\frac{2}{11}(60+40)$ | $\frac{2}{11}(60-40) = \frac{40}{11}$

$= 18\frac{2}{11}$ | $= 3\frac{7}{11}$

⇒ $\boxed{2:18\frac{2}{11}}$, $\boxed{2:03\frac{2}{11}}$ → Two times

⇒ Q: In mirror 2:30 time then actual time

(a) 10:30
(b) 11:30
(c) 9:30
(d) 8:30

Sol^n:- 12:00 − 2:30 = 9:30 ; 2:30 + 9:30 = 12:00

12:00
2:30
9:30

Mirror	Actual
~~12:00~~	
1:00	11:00
1:30	10:30
2:00	10:00
2:15	9:45
2:30	9:30

etc

⇒ Actual time → Mirror time

Actual time	Mirror time
1	11
2	10
3	9
4	8
5	7
6	6
7	5
8	4
9	3
10	2
11	1
12	12

NUMBER SERIES

① 113 85 61 41 (25) 13 5

⊖ 28 24 20

⊕ 4 6 8

× 1 2 4

÷ 64 32 16

Rule for Number Series:-

(I) +, −, ×, ÷

(II) Combination

(III) multiple of any number.

(IV) Square or cubes.

(I) [−, ×] (Subtraction & multiply):-

Ex: 15, 10, 5, 150, 16, 12, 4, 192, 20, 15, 5, (300)? ← missing term.

15−10=5 | 16−12=4 | 20−15=5

15×10=150 | 16×12=192 | 20×15=(300) — Ans

(II) (+, ×) (Addition & multiply) →

Ex: 7, 3, 10, 21, 10, 4, 14, 40, 30, 4, 34, (120)? ← missing

7+3=10 | 10+4=14 | 30+4=34

7×3=21 | 10×4=40 | 30×4=(120) ✓ Ans

Ex: 4, 9, 20, 43, 90 (185) ← missing term

4×2+1=9

9×2+2=20

20×2+3=43

43×2+4=90

∴ 90×2+5=(185) Ans

Ex: (4) 3, 10, 33, 104, ? missing

Sol^{n} $3*3+1=9$

$10*3+3=33$

$33*3+5=104$

$104*3+7=319$ Ans

⇒ SQUARE CUBE of some Number :-

Square :-

$1^2=1$	$23^2=529$	$1^3=1$
$2^2=4$	$24^2=576$	$2^3=8$
$3^2=9$	$25^2=625$	$3^3=27$
$4^2=16$	$26^2=678$	$4^3=64$
$5^2=25$	$27^2=729$	$5^3=125$
$6^2=36$	$28^2=784$	$6^3=216$
$7^2=49$	$29^2=841$	$7^3=343$
$8^2=64$	$30^2=900$	$8^3=512$
$9^2=81$	$31^2=961$	$9^3=729$
$10^2=100$	$32^2=1024$	$10^3=1000$
$11^2=121$		$11^3=1331$ etc.
$12^2=144$		
$13^2=169$		
$14^2=196$		
$15^2=225$		
$16^2=256$		
$17^2=289$		
$18^2=324$		
$19^2=361$		
$20^2=400$		
$21^2=441$		
$22^2=484$		

(I)

(Ex) (1) 113 85 61 41 25 13 5 ← missing term.

28 24 20 16 12 8

(II) (2) 2 8 18 32 50 72

41 − 25 = 16

6 10 14 18 22

18 + 14 = 32

(3) 11 12 14 18 26 42 74 ← missing

1 2 4 8 16 32

18 + 8 = 26

(4) 129, 65, 33, 17, 9, 5, 3 ← missing term

64 32 16 8 4 2

= 17 − 8 = 9

(5) 2 5 16 65 326 ? ← missing term

3 11 49

2 × 2 + 1 = 5

5 × 3 + 1 = 16

16 × 4 + 1 = 65

65 × 5 + 1 = 326

⇒ (6) 1900, 939, 410 ← missing term, 121, 0

961

31^2 21^2 11^2 11^2 ×

31^2 23^2 17^2 11^2

939 − 529 = 410

Prime No. square or Alternative prime # square.

Here alternative prime No. square.

(7) 55 66 187 200 369 386 675 ← missing term.

11 121 13 169 17 289

$(11)^2$ $(11)^2$ (13) $(13)^2$ (17) $(17)^2$

$\Rightarrow 386 + 289 = 675$ Ans

(8) 20, 141, 310, 599, 960, 1489, ——. ← missing

121 169 289 361 529 841

$(11)^2$ $(13)^2$ $(17)^2$ $(19)^2$ $(23)^2$ $(29)^2$

prime no. 2 2 4 2 4 2

(a) 2430
(b) 2330
(c) 2230
(d) 2130

↑ answer may be first answer $1489 + 841 = 2330$

→ 2nd Answer possible as-

Ex - 20 141 310 599 960 1489 2114 ← missing

121 169 289 361 529 625

$(11)^2$ $(13)^2$ $(17)^2$ $(19)^2$ $(23)^2$ 25

2 4 2 4 2

may be

(a) 2114
(b) 2314
(c) 2014
(d) 1914

$\Rightarrow 1489 + 625 \Rightarrow 2114$

(10) 1 3 11 47 239 ← missing 1439

(a) 187
(b) 239
(c) 339
(d) 259.

$1 \times 2 + 1 = 3$

$3 \times 3 + 2 = 11$

$11 \times 4 + 3 = 47$

$47 \times 5 + 4 = 239$ ✓

$239 \times 6 + 5 = 1439$

111 Rule

(11) 2 6 28 174 ← missing. , 1400

fr Rule.

$2 \times 2 + 2 = 6$

$6 \times 4 + 4 = 28$

$28 \times 6 + 6 = 174$

$174 \times 8 + 8 = 1400$

(12) 2 12 56 182 462 992 missing Term.

1st: 1^2+1 | 3^2+3 | 7^2+7 | 13^2+13 | 21^2+21 → | $31^2+31 = 961+31 = 992$

2 4 6 8 10

2nd: 2 12 56 182 462 992 ← missing

2^2-2 4^2-4 8^2-8 14^2-14 22^2-22 32^2-32

2 4 6 8 10

$\Rightarrow 32^2-32 = 1024-32 = 992$

(13) 2, 20, 110, 380, 992 → missing term.

1st one: 1^2+1, 4^2+4 10^2+10 19^2+19 31^2+31

3 6 9 12

$\Rightarrow 361+19=380$

2nd one: 2 20 110 380 992 ← missing

2^2-2 5^2-5 11^2-11 20^2-20 32^2-32

3 6 9 12

$\Rightarrow 400-20=380$

(14) 1320 990 336 6

11^3-11 10^3-10 7^3-7 2^3-2

1 3 5

(15) 4 14 76 364 1364

10 10^2 10^3

$1^3+3\times1$ | $2^3+3\times2$ | $4^3+3\times4$ | $7^3+3\times7$ | $11^3+3\times11$

$64+12 \Rightarrow 76$

(16) 2, 6, 22, 94, 478 ——.

$2\times2+2=6$

$6\times3+4=22$

$22\times4+6=94$

$94\times5+8=478$

$478\times6+10=2878$

(a) 2878 (b) 2868

(c) 2558 (d) 478

⇒ (17) 992, ..., 31, 23, 17, 11, 5, 2

31^2+31 , 23^2+23 17^2+17 11^2+11 5^2+5 2^2+2

alternative form # square

(18) 101 110 1000 1011 1111 10100 ← missing term.

5 6 8 11 15 20

1 2 3 4 5

Binary system

decimal of 20 ⇒ $(10100)_2$ → Binary

(a) 10100
(b) 10010
(c) 11000
(d) 10011

RATIO & PROPORTION

NE / N.R / Data

⇒ Ratio = comparision = division

$A:B = 3:4$

$A/B = 3/4$

⇒ PROPORTION = Ratio are equal.

$a:b :: c:d$

$a:b = c:d$

$\frac{a}{b} = \frac{c}{d}$

$ad = bc$

forth proportion $\Rightarrow d = \frac{bc}{a}$

eg: forth proportion of 18, 36, 48

$d = \frac{bc}{a} = \frac{36 \times 48}{18} = 96$

Two given third proportion -

$\Rightarrow a \& b :: b:c$

$a:b = b:c$

$ac = b^2$

Third proportion $c = \frac{b^2}{a}$

eg: Third proportion of 18, 36

$c = \frac{b^2}{a} = \frac{36 \times 36}{18} = 72$

⇒ a, b, c given

$b^2 = ca \Rightarrow b = \sqrt{ca}$, 2nd proportion also called mean proportion.

Ex mean proportion of 16, 9

$b = \sqrt{c \times a} = \sqrt{16 \times 9} = \sqrt{144} = 12$

① Direct proportion

cost of 5-books = 20

∴ 8-books = 32

② Indirect proportion

work

① 5-men = 10 day

10-men = 5 day

$\frac{\text{less}}{\text{more}} \times 10 \Rightarrow \frac{5}{10} \times 10 \Rightarrow 5$

② 5 men ⇒ 10 day

3-men = $16\frac{2}{3}$ day

$\frac{\text{more}}{\text{less}} * 10 = 5/3 * 10 = 16\frac{2}{3}$ day

Note:→ work problem are Indirect proportion –

eg:① 15-men working 10 days, earn R.s. 500 Rs

How much will 12-men earn working 14-day.

Solu:

15 men — 10 day — earn — 500

12 men — 14 day — earn = 560 Ans

(a) 400
(b) 560
(c) 800
(d) 540

$\frac{\text{less}}{\text{more}} \times \frac{\text{more}}{\text{less}} * 500$ → must

$\frac{12}{15} * \frac{14}{10} * 500 = 560$ Rs.

eg: 15 men → 10 day → 500

12 men → 14 day → 560 Ans

$\frac{\text{more}}{\text{less}} * \frac{\text{less}}{\text{more}} * 10 \Rightarrow \frac{15}{12} * \frac{560}{500} * 10 = 14\text{-day}$.

ex:- 15 men 10 day Earn 500

12 men 14 day Earn 560

Ans

soln: $\frac{\text{less}}{\text{more}} * \frac{\text{more}}{\text{less}} * 15 \Rightarrow \frac{10}{14} * \frac{560}{500} * 15 \Rightarrow 12$ men

⇒ ~~Dough~~ ⇒ Dough-

⇒ Ex-(2) If 3- men and 6-women can do a work in 16-days In how many day can 12 men and 8 women do the same work.

(a) 3 (b) 2 (c) 4 (d) 5

soln ⇒ 3 men or 6-women = 16-days

$3M = 6W$

$1M = 2W$

$12M + 8W = \text{——}$.

$12(2W) + 8W = 32W$

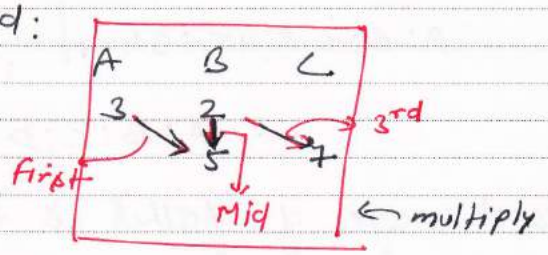
$6W = 16$ day

$32W = \frac{6}{16} * 32$

$= \frac{96}{32} \Rightarrow 3$ day.

Ex:(3) A:B = 3:2 & B:C = 5:7 then A:B:C ?

⇒ Dot Method:



~~Short M~~ A:B:C ⇒ 3*5 : 2*5 : 2*7

= 15:10:14

⇒ 2nd Method: A:B = 3:2 B:C = 5:7

A:B = 5*3 : 5*2 = 15:10

B:C = 2*5 : 2*7 = 10:14

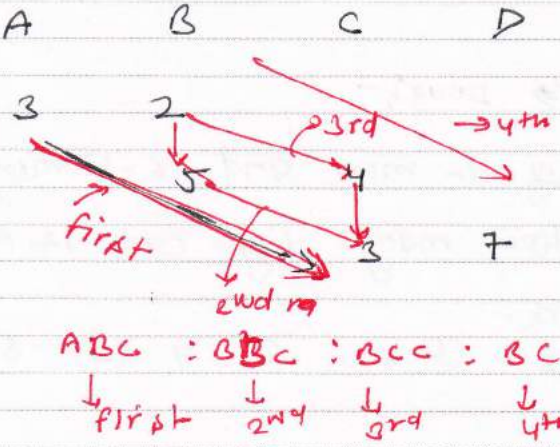
A:B:C = 15:10:14

Ex → (4) A : B = 3 : 2

B : C = 5 : 4 then A : B : C : D = ?

C : D = 3 : 7

Sol^{n} – 1st Method :



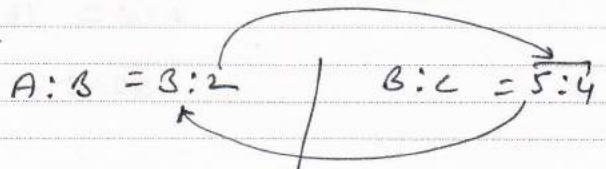
ABC : BBC : BCC : BCD

↓ first ↓ 2nd ↓ 3rd ↓ 4th.

$\therefore$ A : B : C : D = 3×5×3 : 2×5×3 : 2×4×3 : 2×4×7

$\Rightarrow$ 45 : 30 : 24 : 56 Ans

2nd Method :–



A : B : C = 3×5 : 2×5 : 2×4

= 15 : 10 : 8

A : B : C = 15 : 10 : 8 | C : D = 3 : 7

A : B : C = 45 : 30 : 24 | C : D = 24 : 56

$\therefore$ A : B : C : D = 45 : 30 : 24 : 56.

Ex : The present age of father is twice of his son, 8 -year ago hence the ratio will be 7:4 find the age of son 4 years Hence.

Sol^{n} : Present age $\Rightarrow$ Let's x = of son.

F = 2x
S = x
} years

Hence = + after
ago = –

8 -year hence = after 8 years

(2x+8) : (x+8) = 7 : 4

$\frac{2x+8}{x+8} = \frac{7}{4} \Rightarrow x = 24$

4 -year hence age of son = 24+4 = 28 year

4- year ago age of son = 24-4 = 20 year.

Note:- Alway let age of child and compare with parents.

eg:(6) In a bag number of 25P coins 20P coins and 10P coins are in the ratio 3:7:9 and togither of Rs = 61. then # of 10P coins = (a) 140
(b) 180
(c) 160
(d) 60.

solve:

coins	
25	→ 3x
20	→ 7x
10	→ 9x
	61

3:7:9

3x : 7x : 9x

75x + 140x + 90x = 6100 ← Total amount

305x = 6100

x = 20

10P coins ⇒ 9x = 9×20 = 180

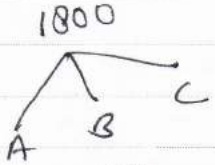
25 → x → 60
20 → x → 140
10 → 9x → 180

Ex(7) divide Rs: 1800 among A, B, C.

A may get as much as half of B and C.

B may get A and C togther, then store of C.

soln:



A = 600

B = 900

C = 300

A = 1/2 (B+C)

= 1/2

B = (A+C)

B = 1/1 (A+C)

B : (A+C) = 1 : 1

B = 900

(a) 600
(b) 900
(c) 300
(d) 1000

A : (B+C) = 1 : 2

Now 3-part = 1800

1-equal part = $\frac{1800}{3}$ = 600

∴ A = 600

B : (A+C) = 1 : 1

Now 2-part = 1800

1 equal part = 900

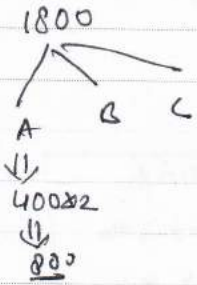
B = 900

C = 900

Extra: Rs = 1800

A = 4/5 (B+C)

A : (B+C) = 4 : 5



9 = Part = 1800

1-part = 200

4 = part = 200×4

= 800

UNIT - 6 - PERCENTAGES

(1) $\frac{1}{4} = \frac{1}{4} * 100 = 25\%$.

$25\% \Rightarrow 25/100 = 1/4$

(2) **Increasing % = $\frac{\text{Increasing value} * 100}{\text{Smaller value}}$**

$25 \rightarrow 40 \Rightarrow \Rightarrow \frac{15 * 100}{25} \Rightarrow 60\%$.

Decreasing % = $\frac{\text{decreasing value} * 100}{\text{Greater value}}$

$80 \rightarrow 60 \Rightarrow = \frac{20}{80} * 100 = \frac{100}{4} = 25\%$.

(3) If $x\%$ and $y\%$ are successive changes -

(changes mean increasing & decreasing both)

(successive means only increasing)

then overall % of change $= x + y + \frac{xy}{100}$ ↑ +ve ↓ -ve

% of change $= x + y + \frac{xy}{100}$

Take Increase → +ve

Decrease → -ve

(4) Population of town increases $r\%$ every year -

(i) then population of town after n-year -

$\Rightarrow$ **present population $* \left(1 + \frac{r}{100}\right)^n$**

(ii) Population of the town n-year ago $\Rightarrow$

present population $* \left(\frac{100}{100+r}\right)^n$

Take always 'r' → +ve' for increasing

'r' → '-ve' for decreasing.

Ex① Income of a person decreased by 20% and then again decreased by 20%. find the total decrease in his income -

(a) 36%
(b) 40%
(c) 38%
(d) 32%

Sol^n - for only two time

$$= (-20) + (-20) + \frac{(-20)(-20)}{100}$$

$$= -40 + 4 = -36\%$$

$\therefore$ Total decreasing $\Rightarrow 36\%$

More than two time -

Let Income $= 100$

→ for two year ago

$$= 100 * \frac{80}{100} * \frac{80}{100} = 64$$

Total decrease $= 100 - 64$

$= 36\%$

decrease $\Rightarrow 100 -$
Increase $\Rightarrow 100+$

→ for three year: $\Rightarrow 100 * \frac{80 * 80 * 80}{100 * 100 * 100} \Rightarrow 64 + \frac{8}{10}\%$

$\therefore$ Total decrease $= \left(100 - 64 + \frac{8}{10}\right)\%$ Ans

Decrease $\Rightarrow 100 -$
Increase $\Rightarrow 100+$

for two year decrease 20% and 1-year increase = 10%. then total

$$\Rightarrow 100 * \frac{80 * 80 * 110}{100 * 100 * 100}$$

Ex: The population of a city increase by 20% every year if the present population is 5,76,000 what was the population of the city 2 years ago.

Sol^n:- $= P.P * \left(\frac{100}{100+r}\right)^n$

$$\Rightarrow 5,76000 * \left(\frac{100}{100+20}\right)^2 = 4,00,000$$

2nd Method:-

Let population 2 years ago = x

Let first year increase = 20%

2nd ——— = 20%.

$x \times \frac{120}{100} \times \frac{120}{100} = 5,76,000$

$\therefore x = 4,00,000$

⇒ Increasing 20% after two year population —

⇒ $5,76,000 \times \frac{120}{100} \times \frac{120}{100} \Rightarrow 8,29,440$ Ans

Ex: (3) There is a 30% increase in the ~~price~~ price of an article, in first year, 20% decrease in 2nd year and 10% increase in next year. If the present price of article is Rs: 2288 then what was the price of the article '3' year ago.

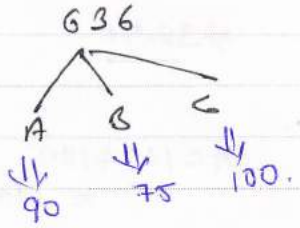
Soln:- let 3- year ago = x

$\Rightarrow x * \frac{130}{100} * \frac{80}{100} * \frac{110}{100} = 2288$

$\Rightarrow x = 2000$

Ex (4) If R.S. = 636 is divided b/w A, B, C. A get 20% more than B, B get 25% less than C, then share of C.

Soln



Let C = 100

B = 75

20% of 75 = $\frac{20 * 75}{100} = 15$

$\therefore$ A = 90

{Note: same we can take other}

A : B : C = 90 : 75 : 100

= 18 : 15 : 20

~~Sum~~ sum of Ratio = 53

$\therefore$ share of C = $\frac{20 * 636}{53} = 240$ Ans

Ex: The ratio of two numbers = 5/6 : 2/3 by what % is the 2nd # more or less in the first Number. —

(a) 25% more
(b) 20% "
(c) 25% less
(d) 20% "

$\frac{5}{6} = \frac{2}{3}$

$\frac{5+4}{6}$

Two # are $5x, 4x$

1st No. 2nd

$5x \leftarrow 4x$

less $\Rightarrow 5x - 4x$

decrease = less = $5x - 4x = x$

$\therefore$ decreasing % = $\frac{x}{5x} \times 100 = 20\%$ (20% less)

first # is increase $\Rightarrow 5x - 4x = x$

increasing of first # % = $\frac{x}{4x} \times 100 = 25\%$

= 25% more.

Ex: ⇒ The length and ~~breadth~~ breath of a rectange increased by 10% and 20%, what is the % of increase in the area of the rectange —

(a) 32%
(b) 40%
(c) 28%
(d) 40%

$A = l * b$ (b above, l below)

⇒ Solve:

$(x+y\%) + \frac{xy}{100}$

$= 10 + 20 + \frac{10*20}{100} \Rightarrow 32\%$

Now

$A = l * b$, $b = 100$, $l = 100$

$A = 100 * 100 = 10000$

$A = l * b$, $b = 120$, $l = 110$

$A = 110 * 120 = 13,200$

increase = 3200

$\therefore$ Increase % = $\frac{3200}{10,000} \times 100 = 32\%$

⇒ Ex - If 5% of A = 20% of B and 10% of B = 15% of C.
If income of C is Rs = 1500 then income of A

(a) 3000
(b) 9000
(c) 6000
(d) 5000

Soln $\frac{5*A}{100} = \frac{20*B}{100}$ / $\frac{10*B}{100} = \frac{15*C}{100}$

$10*B = 15*1500$

$A = \frac{4*2250}{}$ $B = 2250$

⇒ 9000 Ans

Ex ⑧ A man spend 5% of his money and then after spending 75% of Remainder; then he had Rs = 950 left with him.
How much money he had first

(a) 5000
(b) 4000
(c) 3000
(d) 6000

Soln:- Let he had = x

$x = \frac{95}{100} * \frac{25}{100} = 950$

$x = 4000$ Ans

UNIT – 4 PROFIT & LOSS

① C.P. = cost price
S.P = Selling price
Gain (profit) = S.P − C.P
Loss = CP − SP

CP = 100
SP = 120
gain = 120 − 100
= 20

CP = 100
S.P = 70
loss = 100 − 70
= 30

② Gain % = $\frac{\text{gain} * 100}{\text{C.P}}$

③ Loss % = $\frac{\text{loss} * 100}{\text{C.P}}$

gain = $\frac{20}{100} * 100$
= 20%.

loss % = $\frac{30}{100} * 100$
= 30%.

If g = gain
l = loss

③ $SP = C.P * \frac{(100+g)}{100}$

C.P = 500
g = 8%.
S.P = $500 * \frac{108}{100}$ = 540

④ $S.P = C.P * \frac{(100-l)}{100}$

C.P = 1200
l = 10%
= SP = $1200 * \frac{90}{100}$ = 1080

⑤ $C.P. = \frac{SP * 100}{(100 + \text{gain})}$

CP = $\frac{540 * 100}{100+8}$ = 500

⑥ $C.P = \frac{S.P * 100}{100 - \text{loss}}$

⇒ CP = $\frac{1080 * 100}{100 - 10}$ = 1200

Ex-① A shopkeeper selling two computer for R.S. of 24000 each; one P.C. on 20% gain and another on loss 20%.
what is the overall loss or gain of money.

Soln: Note: If selling price of two item are equal & loss and gain are equal then alw of loss happen

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⇒ and that loss are

⇒ $\boxed{\text{loss} = \frac{r^2}{100}}$ ∵ r : loss or gain

r = gain = loss = 20%.

∴ loss $= \frac{r^2}{100} = \frac{20 \times 20}{100} = 4\%$

⇒ Another method :-

Ex: SP = 24,000

g = 20%.

$C.P = \frac{24000 \times 100}{100+20}$

$= 20,000$

S.P = 20000

l = 20%.

$C.P = \frac{30^{0}}{24000 \times 100}$

$\frac{}{100-20}$

$= 30,000$

Total cost price = 20,000 + 30000

= 50,000

SP = 24,000 = 48,000

loss = 50,000 − 48000

= 2000

∴ loss % $= \frac{2000}{50000} \times 100 = 4\%$

Note: this method also work for when selling cost and loss and gain are not equal

② If cost price are equal and gain & loss % equal then no loss no gain

if r = 20% ; 20%.

Ex ② By selling an article ₹ 3000 a person losses by 20%. How much he should gain or loss if selling Rs = 3900.

Soln: 1st method ⇒

3000 = 80%

∴ 3900 = ——

(a) 6% gain

(b) 4% "

(c) 6% loss

(d) 4% loss.

$\frac{3900 - 80}{3000} = 10.4\%$ mean gain

Note:- If in this method we get less than 100% that will show our total loss if we get greater than 100%. we will in gain if exact 100%. no gain no loss.

2nd Method:-

① cost price $= \frac{3000 * 100}{100-20} = 3750$

C.P = 3750

S.P = 3900

gain = ~~150~~ 3900 − 3750 = 150

∴ gain% = ~~3900~~ $\frac{150}{3750} * 100 = 4\%$

Ex-③ A man buys an article for ₹- 7290 and sold at a loss 2/7 of selling price. Then selling price is-

Soln:- S.P = x

C.P = 7290

loss = $\frac{2}{7}x$

loss = ~~CP-SP~~ CP - S.P.

$\frac{2}{7}x = 7290 - x$

$x + \frac{2}{7}x = 7290 \Rightarrow x = 5670$

loss = 7290 − 5670 = 1620

loss% = $\frac{1620}{7290} * 100 = 22.22\%$

Ex-④ If the cost price of 15-articles is equals S.P. of 12 articals find gain or loss.

Soln ⇒ C.P of 15-artical = S.P of 12-article.

(100) (100)

(a) 25% loss
(b) 25% gain
(c) 20% loss
(d) 20% gain

C.P = 12

S.P = 15

gain = 15 − 12 = 3 ∴ gain% = $\frac{3}{12} * 100 = 25\%$

Ex → (15) [illegible] - 5940 and sold them a gain equal to S.P. of 5-tabl. find gain %?

(a) $21\frac{8}{11}\%$

(b) $22\frac{8}{11}\%$

(c) $20\frac{8}{11}\%$

(d) $24\frac{8}{11}\%$

soln: C.P = 5940

S.P = of 1-tabl = x

S.P of 27 tabl = 27x

gain = S.P. of 5 tabl = 5x

S.P = 27x
gain = 5x
C.P = 22x

$\Rightarrow$ gain %. $= \frac{5x}{22x} \times 100$

$= \frac{250}{11} = 22\frac{8}{11}\%$

$\Rightarrow$ C.P. of 1 tabl $= \frac{5940}{27} = 220$

2nd method CP = CP

$22x = 5940$

$x = \frac{5940}{22} = 270$

S.P of 27 tabl $= 270 * 27 = 7290$

S.P. of 5 tabl $= 5 * 270 = 1350$ = gain

gain % $= \frac{1350}{5940} * 100 = 22\frac{8}{11}\%$

also gain = SP - CP = 7290 - 5940 = 1350

UNIT ⇒ DISCOUNT

→ DISCOUNT : only on the marked price (m.p) (list price)
→ MRPX

C.P = 100

M.P = 150

d = 10%

d : 10% of 150 = $\frac{10 * 150}{100}$ = 15

∴ S.P = 150 − 15 = 135

$$S.P = MP * \frac{(100-d)}{100}$$

$$S.P = 150 * \frac{(100-10)}{100} = 135$$

$$MP = \frac{SP * 100}{100-d}$$

} only discount never be loss }

Ex: ① find the single discount equivalent to successive discount 10 % and 20%.

⇒ $x + y + \frac{xy}{100}$

$= (-10) + (-20) + \frac{(-10)(-20)}{100}$

$= -30 + 2$

$= -28$

→ discount mean decreasing so (-ve)

single discount = 28%

2nd method :- Let mp = 100

$d_1 = 10$, $d_2 = 20$

$SP = 100 * \frac{90}{100} * \frac{80}{100} = 72$

∴ single discount = 100 − 72 = 28%

Ex ② An article is marked at R.s. 2500 and the shop keeper allows three discount 10%. 20% and 10%. find S.P = ?

Sol^n ⇒ S.P = 2500 $* \frac{10}{100} * \frac{80}{100} * \frac{90}{100}$ = 1620

discount = MP − SP = 2500 − 1620 = 880

discount % = $\frac{880}{2500} * 100$ = $35\frac{1}{5}$%

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Ex-(3) An person given 25% discount and still gain 20%. How much % above the marked price MP. on the cost price (C.P.).

(a) 30%
(b) 60%
(c) 90%
(d) 70%

Sol:- let C.P. = 100

gain = 20

discount = 25 | d = 25

$$MP = \frac{SP * 100}{100 - d} = \frac{120 * 100}{75} = 160$$

∴ 160 − 100 ⇒ 60%

MP = 150

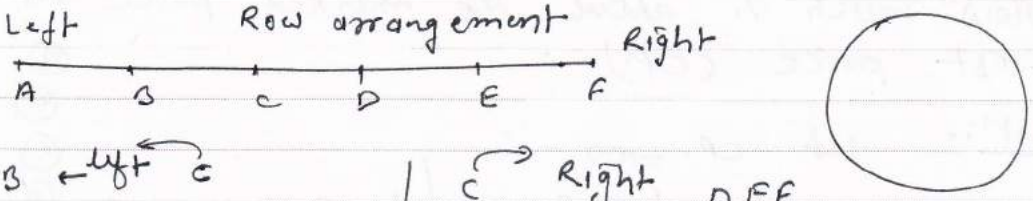
d = 45

C.P = 100 SP = 105

$$d\% = \frac{45}{150} * 100 = 30\%$$

SEATING ARRANGEMENTS

⇒ Row arrangement



A B ← left C

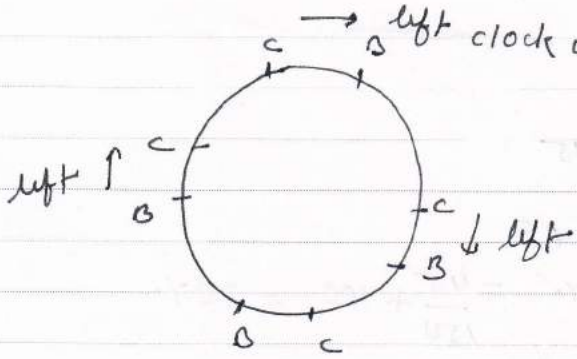
B C immediate left

A don't have immediate left or left

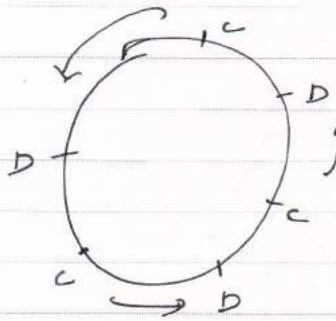
C → Right D E F

C → immediate Right ⇒ D

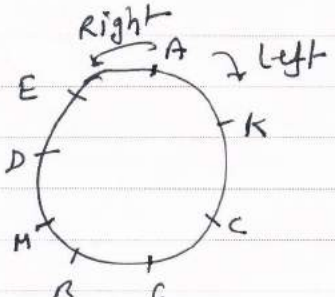
F → don't have immediate Right, no ∞ right.



← left
B C

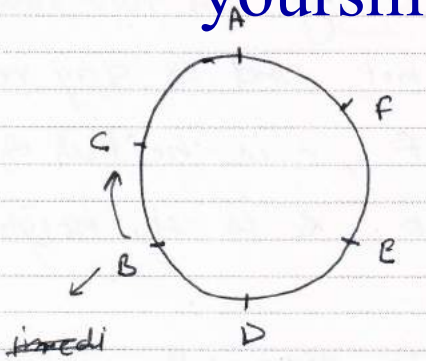


Right
C D

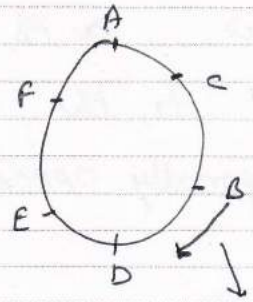


Ex → (1) 6 friends A, B, C, D, E, F are sitting in a closed circle facing the centre A is facing D, C is b/w A & B F is b/w E and A who is the immediate left of B

(a) C
(b) D
(c) C, D
(d) None



immediat left of B = C



Immediat left of B = D

Ans - C, D.

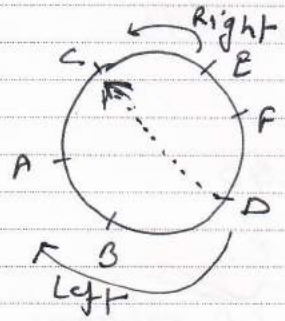
Ex: A, B, C, D, E, F are sitting in a closed circle facing of the centre. D is b/w F and B, A is the second to the left of D and second to the right of E.

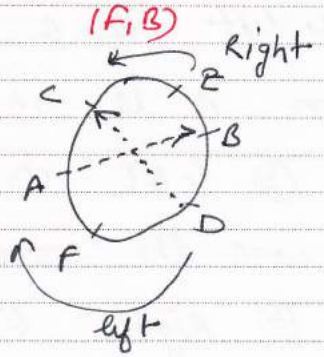
(1) who is facing D

(a) A (b) C (c) F (d) None.

(2) who is facing A.

(a) B (b) D (c) A (d) None



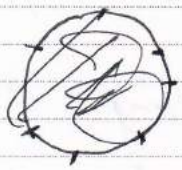


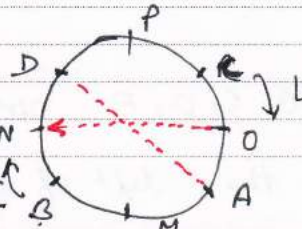
Ex(3) four couples sit arround the table in a party.

(a) Every (b) wife to the left of her husband;

A, B, C, D are husband, M, N, O, P are Wifes

B-N and C-O are married couple. D donot sit next to O. M sit to the left of A, who sit opposite D.





(a) Who is the wife of D

(a) P (b) O (c) M (d) N

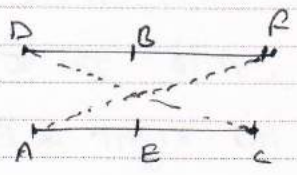
(b) who sit opposite to O.

(a) M (b) N (c) B (d) C

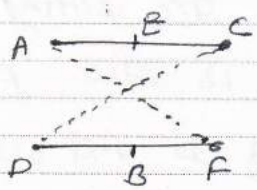
Ex-④ 6 [illegible] two rows. Three in each row. B is E is not end of any row D is the second to the left of F, C is neither of E is sitting diagonally opposite to D. B is the neighbour of F.

① which of the following sitting diagonally opposite to each other. -

(a) F, C (b) D, A (c) A, F (d) A, B



'or'



② who is facing B

(a) A (b) C (c) D (d) E

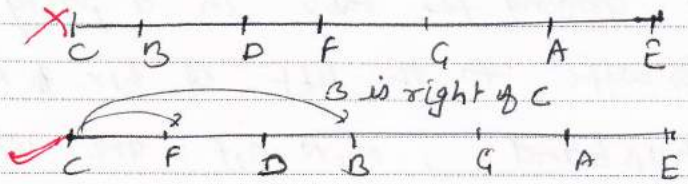
Q.④ Seven person were sitting in a line A was the immediate right of G and immediate left of E, G was the forth to the right of 'C'. D was b/w F and B, C was the left of B at one of the ends.

① The person B is in b/w

(a) D & G (b) G & E (c) F & D (d) C & D

② what was the correct position of E.

(a) left (b) Right (c) extream left (d) extream Right



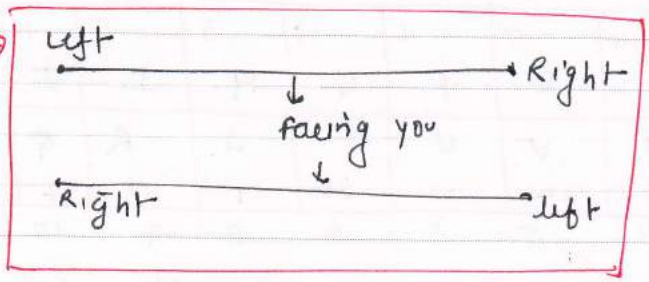
Note:- If immediate given we will consider immediate if immediate is not given then we choose only left or right only require to the condition of question

Ex-⑤ five person A, B, C, D, E are sitting in a row facing you, D is the left of C and B is the right of E, A is the right of C and B is left of D.

If E occupies the corner position, then who is sitting in the centre

(a) A
(b) B
(c) C
(d) D

only for facing you



A C D B E

C → Left D

B ← Right E

A ← Right C

E → corner

D → Left B

UNIT - CODING & DECODING

→ ① letter coding

② Number coding.

26	25	24	23	22	21	20	19	18	17	16	15	14
1	2	3	4	5	6	7	8	9	10	11	12	13
A	B	C	D	E	F	G	H	I	J	K	L	M
Z	Y	X	W	V	U	T	S	R	Q	P	O	N
26	25	24	23	22	21	20	19	18	17	16	15	14
1	2	3	4	5	6	7	8	9	10	11	12	13

When beginning is not possible take no. to ending.

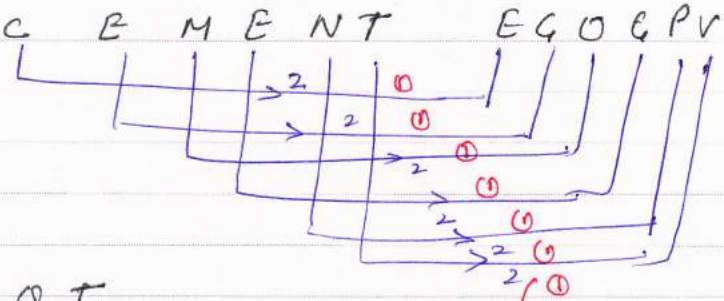
① letter coding : ① one direction :- (starting to starting)-

Ex-① ~~code~~ code of CEMENT is EGOGPV then code for FLOOR

R → Right hand

L ← Left hand

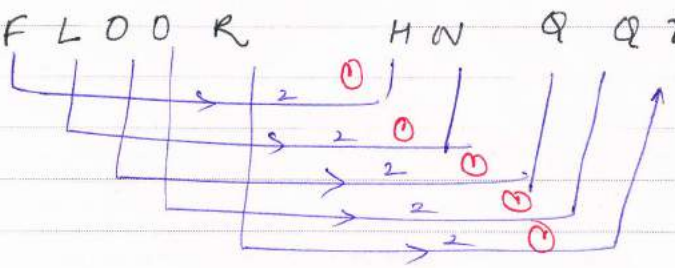
C E M E N T → E G O G P V



one letter b/w these two for all.

then FLOOR -

F L O O R → H N Q Q T

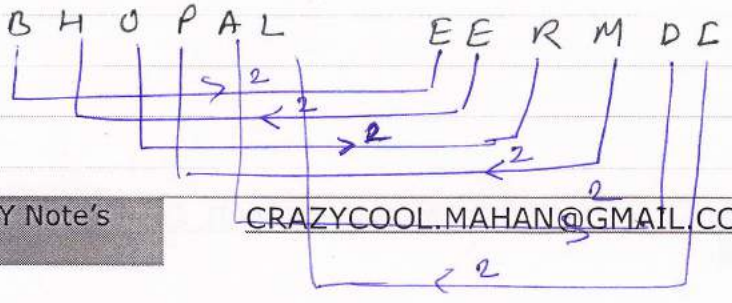


(HNQQT) Ans

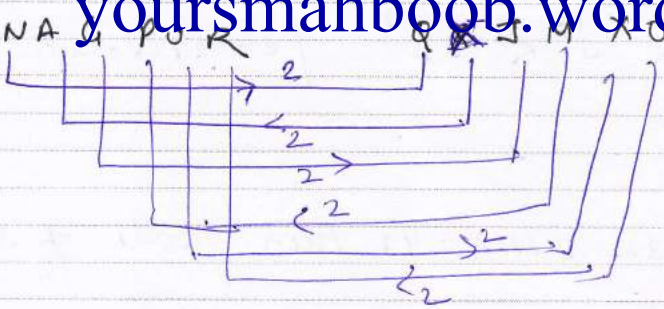
(II) Two Direction :-

Ex: code for BHOPAL is EERMDL then code for NAGPUR

⇒ B H O P A L → E E R M D L



∴ so NAGPUR ⇒



~~Sol~~ Sol: NAGPUR = QXJMXO.

→ Ending to starting :-

Ex: ③ Code of MONKEY is XDJMNL then code of TIGER

⇒ MONKEY → XDJMNL (+1)

similar others

⇒ TIGER → QDFHS (+1, +1)

QDFHS Ans

② Number coding

Ex ① code of APPLE = 50

⇒ then code of ORANGE (a) 60 (b) 70 (c) 80 (d) 90

A P P L E ⇒ 1 + 16 + 16 + 12 + 5 ⇒ 50

∴ O R A N G E

15 + 18 + 1 + 14 + 7 + 5 ⇒ 60 ↵

Ex → ⑤ Code of ~~PARSA~~ PRASANA = 28 then code of APARNA -

⇒ P R A S A N N A

16 18 1 19 1 14 14 1

16 + 18 + 1 + 19 + 1 + 14 + 14 + 1 ⇒ 84 ⇒ 84/3 = 28

∴ 1 16 1 18 14 1

A P A R N A

1 + 16 + 1 + 18 + 14 + 1 ⇒ 51/3 = 17

(a) 16
~~(b) 17~~
(c) 19
(d) 20

Note: dividing always same No. (or) multiply always same both code

Ex → ⑥ code of FIVE = LRRJ then code of ELEVEN

Sol → F I V E = L R R J

6 9 22 5 = 12 18 18 10

R = 18

R = 18 + 26 = 44

ELEVEN = 5 x 5 R 18 | 8 = 2+26 = 28

(from Ending :-)

Ex: code of GO = 32, SHE = 49 then code of SOME
(a) 46
(b) 56
(c) 66
(d) 76

⇒ G O ⇒ 32
7 15
20 12

SHE = 49
19 8 5
8 18 22

SOME ⇒ 8+12+14+22 ⇒ 56
8 12 14 22

Ex → (8) code of MADRAS = 106 then code of KOLKATA
(a) 118
(b) 116
(c) 119
(d) 121

soln:-
13 1 4 18 1 19
M A D R A S
14 26 23 9 26 8

⇒ 14+26+23+9+26+8 = 106

∴ K O L K A T A
16 12 15 10 28 7 26 = 118

Ex:-(9) code of ANANTH = 13 then code of HELP
(a) 5
(b) 41
(c) 58
(d) 60

1 14 1 14 20 8
⇒ A N A N T H

1+14+1+14+20+8 = 58 = 5+8 = 13

8 5 12 16
H E L P

8+5+12+16 = 41 ⇒ 1+4 = 5

Some thing Adding →

Ex: code of MACHINE = 19-7-9-14-15-20-11
then code for DANGER.

⇒ 13 1 3 8 9 14 5
M A C H I N E

(+6) 19-7-9-14-15-20-11

4 1 14 7 5 18
∴ D A N G E R

(+6) 10-7-20-13-11-24 ⇒ 10-7-20-13-11-24 Ans

⇒ In square root and divisibility give priority square root if not both; cube then.

Ex: → code of SANKAR = 8 then code of BALA

(a) 4
(b) 16
(c) 2
(d) 8.

Performance based

19 1 14 11 1 18
S A N K A R

19+1+14+11+1+18 = 64 — $\sqrt{8^2}$ = 8

↳ $\frac{64}{8} = 8$

2 1 12 1
B A L A

2+1+12+1 = 16 — $\sqrt{4^2}$ = 4

↳ $\frac{16}{8} = 2$

Note: ~~Preferce~~ preference square method

Preference Based:-

Ex (12) code of BATTLE = 6 then code of MOTOR

(a) 8 (b) 9 (c) 7 (d) 6

2 1 20 20 12 5
⇒ B A T T L E = 6

2+1+20+20+12+5 ⇒ 60

↳ $\frac{60}{10} = 6$
↳ 6+0 = 0
↳ 6-0 = 6

13 15 20 15 18
M O T O R

13+15+20+15+18 ⇒ 81 ⇒ (81)

↳ $\frac{81}{10} = 8.1$
↳ 8+1 = 9
↳ 8-1 = 7

Note: preference of divide > add > sub

{ If 8.1 is present there then 8.1 is correct }

Ex (13) Code of MOBILITY = 46293927 then code of EXAMINATION -

Soln:-

13 15 2 9 12 9 20 25
M O B I L I T Y
4 6 2 9 3 9 2 7

13 → 1+3 = 4
15 → 1+5 = 6
2 → 0+2 = 2

so ~~Examin~~ so

5 24 1 13 15 9 14 1 20 9 15 14
E X A M I N A T I O N
5 6 1 4 9 5 1 2 9 6 5

Ans

9 = 0+9 = 9
12 = 1+2 = 3
20 = 2+0 = 2
25 → 2+5 = 7

Ex: ~~CODE~~ code of COW = 3 then code CALF
(a) 4 (b) 22 (c) 0 (d) 6

Sol^n:- 3 15 23
C O W

3+15+23 = 41 ⇒ 4-1 = 3

3 1 12 6
CA LF

3+1+12+6 = 22 ⇒ 2-2 = 0

Ex- (15) code of AT = 20, BAT = 40 then code of CAT = ?
(a) 70 (b) 60 (c) 80 (d) 90

⇒ 1 20 2 1 20 3 1 20
AT BAT CAT

1×20 = 20 2×1×20 = 40 3×1×20 = 60

Ex- (16) code of SALE = 20, PURCHASE = 72
then code of MARKET -
(a) 22 (b) 42 (c) 52 (d) 62

19 1 12 5
⇒ SALE ⇒ 20
8 26 15 22

4^2+4

PURCHASE
→ $8^2+8 = 72$

MARKET
→ $6^2+6 = 42$

N ²⁄ W
N ³⁄ N
→ check when beginning & Ending not possible.

Ex → (17) Code of RED = 6720 then code of GREEN

18 5 4
⇒ RED = 6 7 20
4+2
5+2
18+2

G R E E N (+2)
7 16
⇒ 16 7 7 20 9
⇒ 16 7 7 20 9 Ans

UNIT - TIME & WORK

Ex (1) A can do the work in 10-days

→ B can do the same work in 15-days

(A+B) together ——————

A's one day work = $\frac{1}{10}$

B's ——————— = $\frac{1}{15}$

(A+B)'s one day work = $\frac{1}{10}+\frac{1}{15} = \frac{1}{6}$

∴ (A+B)'s both together that work = 6 Days

(A) (A+B)'s work = 11
(B+C)'s = 14
(C+B)'s = 10
what day for alone work

← most common problem

Ex (2) work

5 -men = 10 day

10-men = (5-day)

$\frac{\text{less}}{\text{more}} \times 10 = \frac{5}{10} * 10 = 5$

Ex: (3) 5 men = 10 day

3 men = ——— → $16\frac{2}{3}$ day ans

$\frac{\text{more}}{\text{less}} * 10 \Rightarrow \frac{5}{3} * 10 = 16\frac{2}{3}$

Ex (4) (A+B) = 6-day

A = 10-day.

B = (15) day Ans

A's one day work = $\frac{1}{10}$

(A+B)'s ——— = $\frac{1}{6}$

∴ B'-s one day work = $\frac{1}{6}-\frac{1}{10}$

$= \frac{10-6}{60} = \frac{4}{60}$

$= \frac{1}{15}$

∴ B's can in (15) days

Ex: ⑤ (A+B) = 3, (B+C) = 4, (C+A) = 6 } days then

A = 8 days

B = $4\frac{4}{5}$ day

C = 24 day.

$(A+B) + (C+A) - (B+C) = 2A$

$\therefore A = \frac{1}{2}$ of $[(A+B) + (C+A) - (B+C)]$

$= \frac{1}{2}\left[\frac{1}{3} + \frac{1}{6} - \frac{1}{4}\right] = \frac{1}{8} = 8$ day

One day work of B's. —

$B = \frac{1}{3} - \frac{1}{8} = \frac{5}{24}$ day

$\therefore$ B can in $\frac{24}{5}$ day $= 4\frac{4}{5}$ days

$\therefore C = 24$ day.

Ex → ⑥ A is 20% less efficient than B. If B alone can do the work in 40 day. In How many day A and B together complete the same work.

$\Rightarrow A = 80\%$ of B

$A = \frac{80}{100} * B$

$= \frac{4}{5} B$

B = 40 day

B's one day work $= \frac{1}{40}$

one day work of A = $\frac{4}{5}$ × B's one day work

$= \frac{4}{5} * \frac{1}{40} = \frac{1}{50}$

So A can complete the work in 50 day.

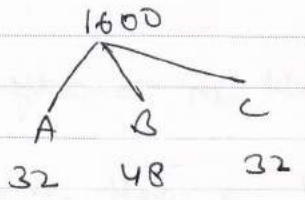
one day work for A and B = $\frac{1}{50} + \frac{1}{40} = \frac{9}{200}$

So time to need A and B to complete —

then all work $= \frac{200}{9} = 22\frac{2}{9}$ days.

Ex: ⑦ A can do the work in 32-days, B can do the same work in 48 day so they together undertake to do a work ₹ = 1600;

with the Help of 'c' ~~they~~ ~~they~~ they finished the work in 12-days. Then share of 'C'.



one day work of 'c'

$$C = \frac{1}{12} - \frac{1}{32} - \frac{1}{48}$$

$$= \frac{3}{96} = \frac{1}{32}$$

∴ 'c' can complete that work = in 32 days.

One day Ratio $= \frac{1}{32} : \frac{1}{48} : \frac{1}{32} = \frac{3:2:3}{96}$

$= 3:2:3$

$C = \frac{3}{8} * 1600 = ₹600$

$A = ₹600$

$B = ₹400$

Ex: ⑧ If 4-men and 3-women can do a work in 8-days

6-men & 9 ——— 4-days

In how many day can 20-men and 6-women can do the same work.

⇒ $4M + 3W = 8$

one day work of $(4M + 3W) = \frac{1}{8}$

$32M + 24W = 1$

$6M + 9W = 4$ day

one day work $= \frac{1}{4}$

$(6M + 9W) = \frac{1}{4}$

$24M + 36W = 1$

$20M + 6W =$ ——— day.

$32M + 24W = 24M + 36W$

$8M = 12W$

$M = \frac{3}{2}W$ ⇒ Now $4 \times \frac{3}{2}W + 3W = 8$ day.

$9W = 8$ day

one day work of women $= \frac{8}{9}$ (put in above eqn

$\Rightarrow$ $20M + 6W =$ ____ day ?

$20 \times \frac{3}{2} W + 6W = 36W$

$9W = 8$ day

$\therefore 36W = \frac{9}{36} \times 8 = 2$ day.

Ex(5) 5-skilled workers can build a wall in 20-days
(1-skilled worker = 100-day)
8- semi skilled workers can build a wall 25-day
((1 s.s. work = 200-day)
10- unskilled workers can build a wall in 30-days
(1 u.s.w = 300 day)

If a team has 2-skilled, 6-semiskilled and 5-unskilled workers. How long time it build the work

$\Rightarrow$ Soln: one day work of team =

2 skilled + 6-semi skilled + 5-unskilled.

$\hookrightarrow 2 \times \frac{1}{100} + 6\left(\frac{1}{200}\right) + 5\left(\frac{1}{300}\right)$

$\Rightarrow \frac{2}{100} + \frac{3}{100} + \frac{5}{300} = \frac{6+9+5}{300} = \frac{20}{300} = \frac{1}{15}$

so total work would be done = 15-day.

(a) 16
(b) 20
(c) 15
(d) 18

Ex:- A and B can do a work in 24 day and 36-day respectively.
A starts the works and B join him after some day and they do the remaining work in 6-days. After How long many days did B joined with A.

(a) 16 (b) 14 (c) 20 (d) 10

A work ... some day → A completed ... ⇒ $7/12$ ⇒ $7/12 * 24 = 14$-day.

(A+B) together = 6 day → (A+B) one day work = $\left(\frac{1}{24}+\frac{1}{36}\right)$ ②

(A+B) work → $6*\left(\frac{1}{24}+\frac{1}{36}\right) = 5/12$ — ①

$(A+B)'s$ one day work = $\frac{1}{24}+\frac{1}{36}$

$(A+B)'s$ 6-day work $= 6\left(\frac{1}{24}+\frac{1}{36}\right) = 5/12$

Remaining work which is done by A-alone $= 1-\frac{5}{12} = \frac{7}{12}$

$\therefore 7/12$ work A can day $= 7/12 * 24 = 14$-day Ans

Ex → (11) A, B, C can do a work in 20, 15, 12-day respectively.

A is assisted by B on one day and by C on next day alternatively. How long the work will be finished.

A+B	A+B
A+C	A+C
A+D	A+B
A+E	A+C

A, B, A, B

Type alternative — second type

(a) 32

(b) 8

(c) 16

(d) 14

Soln ⇒ (A+B)'s 1st day work $= \frac{1}{20}+\frac{1}{15} = \frac{7}{60}$

(A+C)'s 1st 2nd ——— $= \frac{1}{20}+\frac{1}{12} = \frac{8}{60}$

so thure for two day work $= \frac{7}{80}+\frac{8}{60} = \frac{1}{4}$

so one day work of (A+B+C) $= \frac{1}{2}*\frac{1}{4} = \frac{1}{8}$

So total work in 8-day by (A, B, C)

A+B = 7/60
A+C = 8/60
A+B = 7/60
A+C = 8/60
A+B = 7/60
A+C = 8/60
A+B = 7/60
A+C = 8/60

$\Rightarrow \frac{28}{60}+\frac{32}{60} = \frac{60}{60} = 1$ complete work

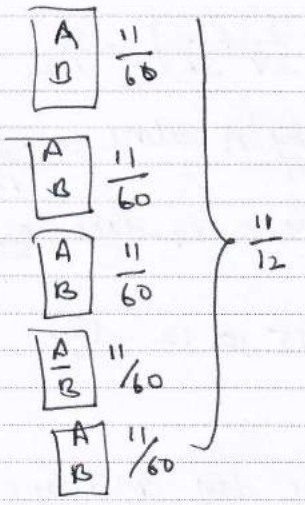
Ex (12) If A and B can do a work in 10 days, 12-day respectively. If they work alternatively days - If A starting when ~~all~~ will the work finishing -

solve: ~~(a)~~ $10\frac{5}{6}$ (b) 11 (c) $11\frac{5}{16}$ (d) 10

Soln:

2-day work of (A,B) = 1-day work of A + 1-day work of B.

$= \frac{1}{10} + \frac{1}{12} = \frac{11}{60}$



10-day work of (A+B) = 5 * (2-day work of A+B)

$= 5 * \frac{11}{60} = \frac{55}{60} = \frac{11}{12} < 1$

{Note: Take always less}

Remaining work $= 1 - \frac{11}{12} = \frac{1}{12}$ work.

$\frac{1}{12}$ work A can do $= \frac{1}{12} * 10 = \frac{5}{6}$ day.

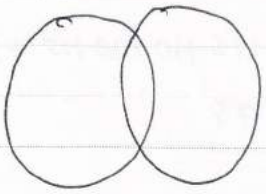
$= 10 + \frac{5}{6} = 10\frac{5}{6}$ day.

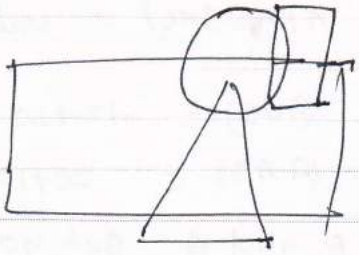
A = $\frac{1}{12}$

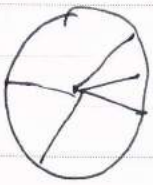
$\frac{1}{12} + \frac{11}{12} = 1$

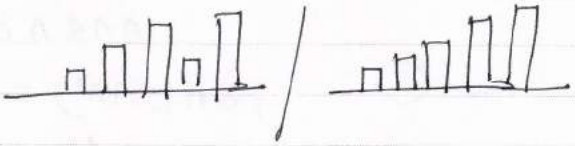
$\Rightarrow$ If B starting $= \frac{1}{12} *$ work $= \frac{1}{12} * 12 = 1$

$= 10 + 1 = 11$-day

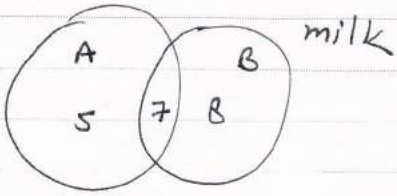








Ex



① Tea but not milk = 5 ✓ ⇒ only tea.

$(A \cap B') =$ only $A = 5$

$(A - B) =$ only $A = 5$

② $(B \cap A') =$ only $B = 8$

$(B - A) =$ only $B = 8$

③ $(A \cap B) = 7$

④ $(A \cup B) = 5 + 7 + 8 = 20$

⑤ $n(A \cup B) = n(A) + n(B) - n(A \cap B)$

$n(A) = 5 + 7 = 12$

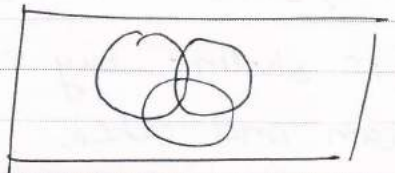
$n(B) = 8 + 7 = 15$

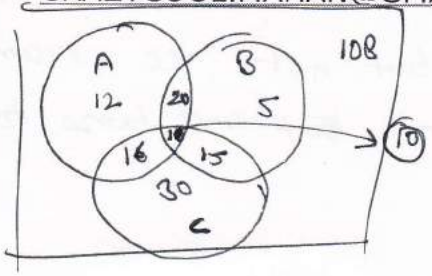
$n(A \cap B) = 7$

$\therefore n(A \cup B) = n(A) + n(B) - n(A \cap B)$

$= 12 + 15 - 7 = 20$

⇒ ⑥ $n(A \cup B \cup C) = n(A) + n(B) + n(C) - n(A \cap B) - n(A \cap C) - n(B \cap C) + n(A \cap B \cap C)$





Ex① - $n(A \cup B \cup C)$ = value of $(A \cup B \cup C)$

$= 12+20+16+10+30+15+5 = 108$

② $(A \cup B) = 12+20+10+10+15+5 = 78$

③ $(A \cap B) = 20+10 = 30$

④ A and B, But not C = 20

$A \cap B \cap C' = 20$

⑤ $(B \cap C \cap A') = 15$

⑥ $(A \cap C \cap B') = 10$

⑦ $(B \cap C) = 15+10 = 25$

⑧ $(A \cap C) = 16+10 = 26$

⑨ $A \cap B' \cap C'$ = only A = 12

⑩ $A \cap B \cap C = 10$

⑪ $A \cap (B \cup C)$ $= 20+16+10 = 46$

$A \cap (B \cup C) = A \cap B \cup A \cap C$

$= n((A \cap B) \cup (A \cap C))$

$= n(A \cap B) + n(A \cap C) - n(A \cap B \cap C)$

$= 30+20-10$

⑫ $B \cap (A \cup C)$ $= 20+15+10 = 45$

⑬ $C \cap (A \cup B)$ $= 16+15+10 = 41$

Ex② At Break time 123 students go to school canteen which selling cakes, ice-creams and buns, 42 - student buy ice cream, 30 - student by buns, 10 only buy only buns., 15 student buy ice cream and buns, 10 - student ice cream and cakes, 4 - buy cakes and buns but not ice cream, and 11 - buy ice cream and buns no - cakes.

(4) How many student buy none of these.

(a) 73 (b) 40 (c) 50 (d) 60.

(2) How many student buy exact two items-

(a) 21 (b) 23 (c) 26 (d) 27

$\Rightarrow n(I) = 42$

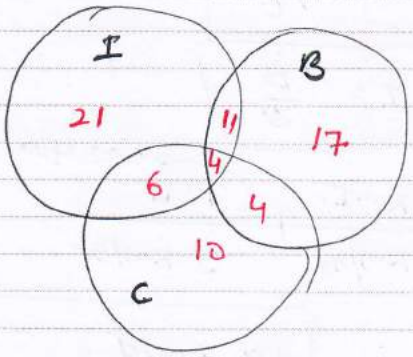
$n(B) = 36$

$n(C) = 10$ (only cake)

$n(I \cap B) = 15$

$n(I \cap C) = 10$

$n(I \cap B \cap S') = 11$



$\Rightarrow$ No. of student Buying

no-item $= 123 - 73 = 50$

$\Rightarrow$ Exact two item student buying $= 11+6+4 = 21$

(3) Buy exactly one item $= 48$

(4) Buy atleast two item = Two or more

$= (11+6+4)+4 \Rightarrow 25$

(5) Buy atleast one item $= 73 = (21+17+10)+(11+6+4)+4$

$= 73$

(6) % of buying student $= \frac{73 * 100}{123} = 59.33\%$.

(7) % of only cake buying student out of buying

$= \frac{10 * 100}{73} =$

⇒ Distance

① Distance = speed × time

D S t

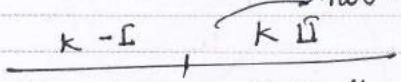
$S = D/t$

$T = \frac{D}{S}$

1 m/sec = 18/5 km/hr

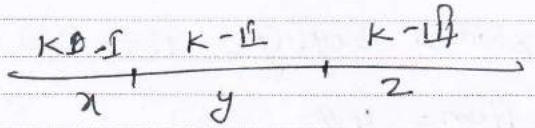
1 km/hr = 5/18 m/sec

② (for two equal part with speed x, y)



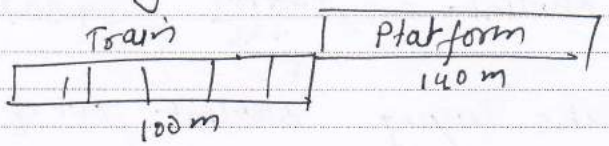
$$\text{avg speed} = \frac{\text{Total distance}}{\text{Total time}} = \frac{2xy}{x+y}$$

③ (Three same part of distance)



$$\text{Avg speed} = \frac{3xyz}{xy+yz+xz}$$

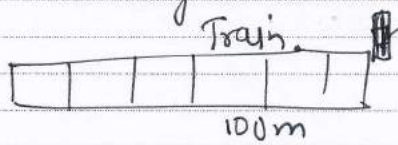
④ Train crossing a platform or a bridge –



∴ Total distance = length of train + length of platform

= 100 + 140

⑤ Train crossing a man or a Tree or a pole –



length of pole, man, Tree = negligible = 0

Total distance = length of train + 0

= 100

Ex ⇒ Q:① A man travelled a certain distance by train at speed of 50 km/hour and come back by running at speed of 8 km/hr. The journy took 2-hours 54 minutes. what distance did he travelled by train.

(a) 40km
(b) 20km
(c) 10 km
(d) 15km.

Sol^n:- Avg speed $= \frac{2xy}{x+y} = \frac{2*50*8}{50+8} = \frac{800}{50}$ km/hr

time $= 2 + \frac{54}{60} = \frac{174}{60}$ HOURS.

Total distance $= \frac{800}{58} * \frac{174}{60} = \frac{800}{20} = 40$km

By train $= \frac{1}{2} * 40 = 20$km

By Running $= 20$km

Ex② A car travel a distance 840 km at a uniform speed. If the speed of the car is 10km/hr more, It take 2-hour less to cover the same distance than the original speed of car was —

(a) 70km/hr
(b) 80 km/hr
(c) 40 km/hr
(d) 60km/hr

Sol^n → 840 km

original speed $= x$ km/hr, time $= \frac{840}{x}$ hour

$(x+10)$ km/hr, time $= \frac{840}{(x+10)}$ hour

$\Rightarrow \frac{840}{x} - \frac{840}{(x+10)} = 2$

$840(x+10) - 840x = 2(x)(x+10)$

$840x + 8400 - 840x = 2x^2 + 20x$

$x = 60$, ($x = -70$ → Speed can't go -ve)

so $x = 60$ km/hr

Ex-(3) A bus without stoppages travels from delhi to chandigarh. with a speed of 65 km/hr and with stoppages its speed is reduced to 52 km/hr. How many does the bus stops & Avg per hours — (a) 12 (b) 18 (c) 16 (d) 21

Soln:- $\frac{65-52}{65} = \frac{1}{5}$ hour ← shortcut method (no-unit)

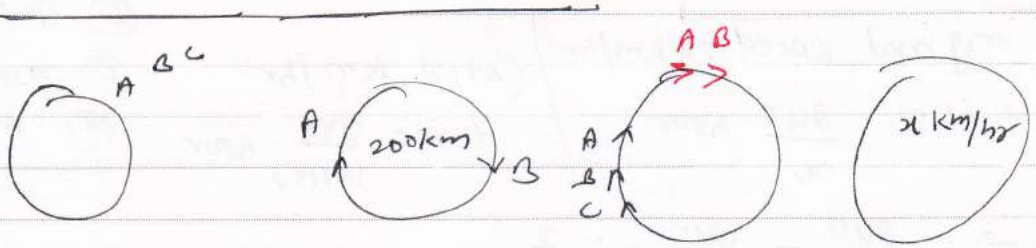
$\frac{1}{2} * 60 = 12$ minute

Non stop
65 km/hr
65 km = 1 Hour
= 60 min
Non stop = 52 km = 48
$= \frac{52}{65} * 60$

stop
52 km/hr
stop = 52 km = 1 hour = 60 min
Non stop = 48

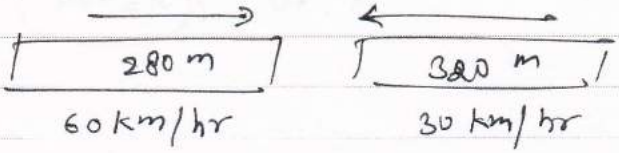
(60 − 48) = 12 minute

⇒ Opposit & Same direction problem:



Ex:(4) Two train 200 M & 320 M are running in opposit direction. The speed of the two trains are 60 km/hr and 30 km/hour. In what time the two trains cross each other.

Soln.



Total distance = 320 + 280 = 600 m

total speed = 60 + 30 = km/hr = 90 * km/hr

∴ Time = $\frac{600 \text{ m}}{25 \text{ m/s}}$ ⇒ $90 * \frac{5}{18}$ m/sec = 25 m/sec.

⇒ 24 sec. Ans

$\therefore$ time $= \frac{\text{distance}}{\text{speed}} = \frac{600}{25\ m/s} = 24$ sec

$\Rightarrow$ same direction :-

for above two trains (if they cross each other in same direction)

total distance $= 280 + 320 = 600$ m

total speed $= 60 - 30 = 30$ km/hr $= 30 * \frac{5}{18} = \frac{25}{3}$ m/sec

$\therefore$ time $= \frac{600}{25} * 3 = 72$ sec.

Ex-(3) If A and B run at 6 km/hr and 12 km/hr and circular track length of circle = 6 km long. when will they meet for first time they are running opposite direction.

(a) 20 min (b) 25 min (c) 16 min (d) 24 min

Soln:

time $= \frac{6}{6+12} = \frac{6}{18} = \frac{1}{3}$ HOUR $= \frac{1}{3} * 60$ minutes $= 20$ minutes

same direction :-

time $= \frac{6}{12-6} = 1$ HOUR $= 60$ minutes

Ex (6) A & B Run arround the circular track of length 600 m at the respective speed of 15 m/sec and 20 m/sec. starting from the same point and at the same time travelling in the same direction.

when will they ~~are~~ meet each other at starting point for the first time

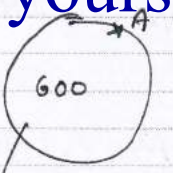
~~(a)~~ 2 min

(b) 4 min

(c) 6 min

(d) 7 min

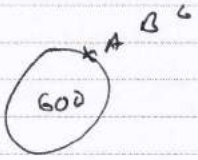
Soln:



time = LCM of $\left[\frac{600}{15}, \frac{600}{20}\right]$

= LCM of [40, 30] = 120 sec

if there are person A, B, C

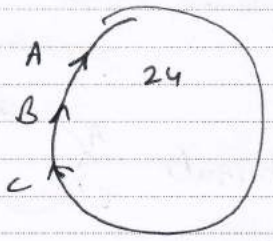


Any where on the track

time = $\frac{600}{20-15} = \frac{600}{5}$ = 120 sec = 2 min.

⇒ Ex: If A, B, C run at 12 km/hr ~~track 16km~~ 8 km/hr and 16 km/hr on a circular track of 24 km long. When will they meet for first time. If they are running in the same direction.

⇒ Note:- If starting point is same ~~again~~ given then this case only take starting point else take anywhere



⇒ Time = LCM of $\left[\frac{24}{12-8}, \frac{24}{16-8}\right]$

= LCM of $\left[\frac{24}{4}, \frac{24}{8}\right]$

= LCM of [6, 3]

= 6 hours Ans

If starting point are same.

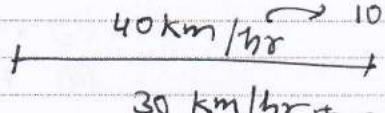
Ex-(8) A train reaches its destination 10-minute late; when it drives at 40 km/hr and 16-minute late when it drives at 30 km/hr.

what is the distance b/w the station

(a) 12 km (c) 16 km

(b) 14 km (d) 18 km

Soln:-



Let distance = x km ⇒ difference = 16 − 10 = 6 minute

= 6/60 = 1/10 hour

$t_1 = \frac{x}{40}$ hour

$t_2 = \frac{x}{30}$ hour

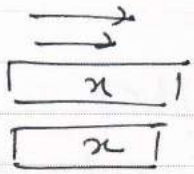
$\therefore \frac{x}{30} - \frac{x}{40} = \frac{1}{6}$

$10x = 120$

$x = 12$ km Ans

Ex (9) Two trains of equal length are running as parallel lines in the same direction at 46 km/hr and 30 km/hr. The faster train passes the slow train in 36 sec then length of each train is –

Soln:-



(a) 50 m
(b) 72 M
(c) 80 M
(d) 82 M.

Total distance $= x + x = 2x$

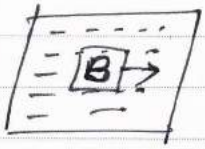
total speed $= 46 - 36 = 10$ km/h $= 10 \times \frac{5}{18} = \frac{25}{9}$ m/s

time $= \frac{D}{S} = \frac{2x}{25/9} = 36$ sec.

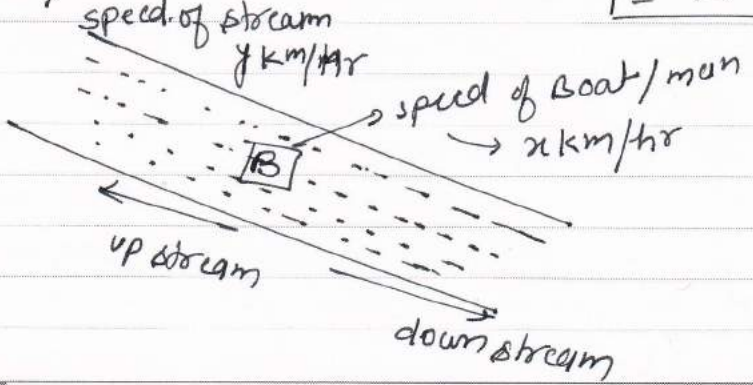
$\Rightarrow x = 50$ m

Boat :-

Speed of the Boat (man) only in the still water



$\Rightarrow$



(1) Speed of boat = x km/hr
the stream = y km/hr

(2) Down stream = $(x+y)$
up stream = $(x-y)$

(3) Speed of the boat = $\frac{1}{2}$ (Down + up)

(4) Speed of the stream = $\frac{1}{2}$ (Down - up)

ex:-(1) speed of the boat = 15 km/hr
stream = 10 km/hr

down stream = 15+10 = 25 km/hr

up stream = 15-10 = 5 km/hr

speed of boat = $\frac{1}{2}[25+5]$ = 15 km

speed of stream = $\frac{1}{2}[25-5]$ = 10 km/hr

UNIT – BLOOD RELATION

① Your wife and your brother's sister each other as ↳ co-sister.

② Your father and mother sister's husband each other as ↳ co-brother.

③ Mother's sister of your ⇒ Maternal aunty

mother's brother ⇒ maternal uncle (mama), मामा

Mother's sister ⇒ anti or maternal anti

↓ anti husband

↓ only uncles.

father brother ⇒ uncle (paternal uncle)

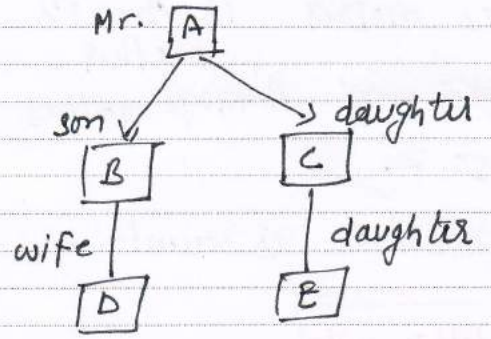
→ Brother son ⇒ nephew ← sister's son

" daughter → niece ← daughter.

→ mother's mother → Grand mother (maternal grand mother)

⇒ maternal uncle son ↳ cousin

daughter ⇒ cousin



① { A – related to B; A is father of B }

② { B – related to A; B – is son of A }

③ { B – related to E; B – is maternal uncle of E }

④ { E – related to B; E is the neice of B }

⑤ { A – related to D; A is father in law of D }

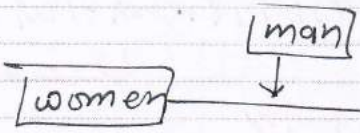
⑥ { D – related to A; D – is daughter in law of A }

⑦ { D – related to C; D – is the sister in law of C }

Ex-① Introducing a man, a woman said his wife is the only ~~day~~ daughter of my father. How is the woman related to the man.

(a) sister in law
(b) Brother in law
(c) wife
(d) Husband.

Sol^{n}.

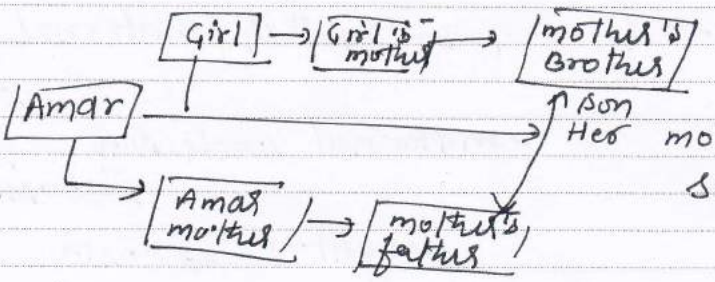


the women is the wife of the man.

Ex-② Pointing to a girl in the photograph, Amar said her mother's brother is the only son of my mother father. How is the Girl mother related to Amar.

(a) mother (b) sister (c) Aunt (d) Grandfather.

Sol^{n}:



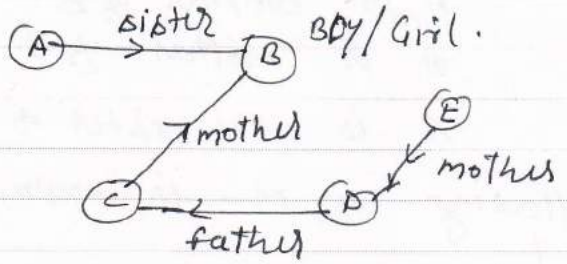
Note:- when only given then Girl's mother is Amar's mother.
- Here not given so girl's mother and Amar's mother we will take as sister so. —
So Amar and girls mother relation is aunt.

Note: Only → read. is very intelligently.
↳ It has a very importance.

Ex:③ A is B's sister; 'C' is B's - mother. D is 'C' father; E is D's mother then How is A related to D

(a) Grand father (b) Grand daughter
(c) Grand mother (d) daughter

Soln →



A related to E ⇒ Great Grand daughter of E.

Ex-(6) There are 6 Person's A, B, C, D, E, F ; C is the sister of F, B is brother of E's husband. D is the ~~daughter~~ father of A, B and Grand father of F. There are two father, three brother and one mother in the group-

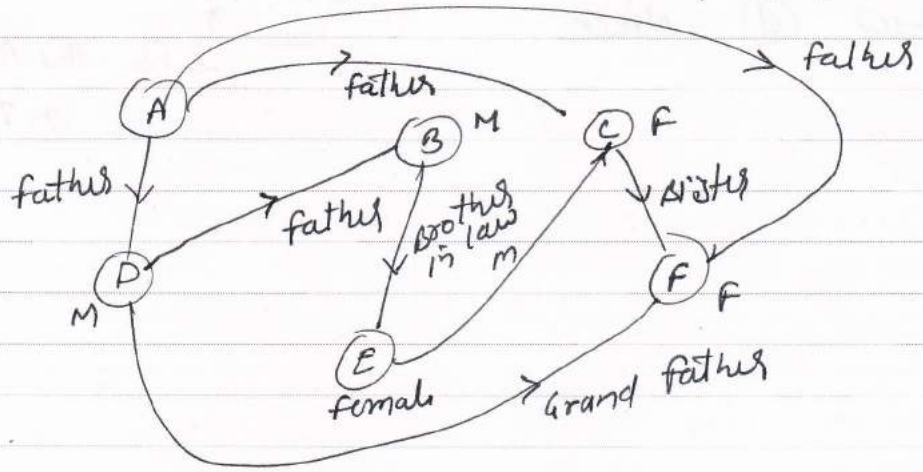
(a) who is the mother ⇒ E

(b) Who is E's husband ⇒ A

(c) How many mal member are in the group ⇒ D, B, A, F

(d) How is F-related to E,

F is son of E Ans



Three Brother (A, B brother), F of e

(1) (2) (3)

① A+B means A is brother of B
A−B " A is mother of B
A*B " A is the sister of B.

which of the following is; M− is maternal uncle of R.

(a) M+K+R (b) M−R+K
(c) M+K−R (d) M+K*R

Brother
M+K−R
mother
m is the maternal uncle of R.

Q:② P*Q means P is the sister of Q
P+Q " P " father " Q
P−Q " P " Mother " Q

If S*M+T then what is S to T

(a) Uncle (b) Aunt
(c) Nephew (d) Niece

sister father
S*M+T
S is the Aunt of T.

⇒ Simple Interest (SI)

P = Principle

R = Rate of interest per annum

T = Time Period.

① $SI = \frac{P*R*T}{100}$ → $P = \frac{SI*100}{R*T}$, $R = \frac{SI*100}{P*T}$, $T = \frac{SI*100}{P*R}$

Ex: P = 10,000

R = 2 4 %.

T = 1 year.

$SI = \frac{10,000*24*1}{100} = 2400$ Rs.

② Total Amount ⇒ A

$A = P + SI$ ⇒ $A = 10,000 + 2400$

$= 12,400$ ₹

③ $P = \frac{100*A}{100+R*T}$

$P = \frac{100*12400}{100+24*1} = 10,000$ ₹

④ $SI = \frac{A*R*T}{100+R*T}$ ⇒ $\frac{24,000*24*1}{100+24*1}$ ⇒ SI = 2400

Ex ① what sum of money will amount to ₹ 747.50 in 3-years. The rate of interest being 4%, 5% and 6% during 1st year, 2nd year and 3rd year respectively -

(a) 600
(b) 650
(c) 640
(d) 680

Solu Let principle amount ⇒ P = 100

4% 5% 6%

4+5+6 = 15

∴ A.I 100+15 = 115

A - P

115 100

747.5 →

⇒ $\frac{747.50*100}{115}$ ⇒ 650 Rs

Note: If there is not defined the interest type then always take simple interest by default.

Ex-(2) In what principle will amount to Rs 570 at 4% P.A. in 3½ year..

$\Rightarrow P = \frac{100 * A}{100 + R * T}$

$= \frac{100 * 570}{100 + 4 * \frac{7}{2}} = 500$

(a) 400
(b) 500
(c) 475
(d) 520

Ex-(3) A sum of money amount to ₹ 1760 in 2-year and ₹ 2000 in 5-year at simple interest. Then find the principle.

1760 = P + S.I for 2-year —①

2000 = P + SI for 5-year —②

240 = SI for 3-year

So for 1 year SI = 80

So principle amount = 1760 − 80×2

or

2000 − 80×5

(a) 1400
(b) ~~1600~~ 1500
(c) ~~2000~~ 1600
(d) 1650

Note:- If two eqn given solve these two ⇒ ₹ = 1600 Rs

If three eqn given solve any of 2-:

Ex(4) In how many year will a sum of money become triple at 5% per annum at simple interest.

soln- Let principle = P

A = 3P

SI = 3P − P = 2P

$SI = \frac{P * R * T}{100}$

$2P = \frac{P * 5 * T}{100} \Rightarrow 200 = 5T$

T = 40 year.

⇒ COMPOUND INTEREST (C.I) :-

yearly | Half yearly | quaterly | monthly

Half yearly: $r \to r/2$, $n \Rightarrow 2n$

quaterly: $r = r/4$, $n = 4n$

monthly: $r = r/12$, $n = 12n$

① $$A = P\left(1+\frac{r}{100}\right)^n$$

A = total amount
P = Principle amount
r = rate of interest per annum.
n = time period.

$$C.I = A - P$$

or $$C.I = P\left(1+\frac{r}{100}\right)^n - P$$

eg:

yearly → P = 8000, r = 12% p.a. (per annum), 2 = years = n

yearly $A = P\left(1+\frac{r}{100}\right)^n$

$A = 8000\left(1+\frac{12}{100}\right)^2$

$n = 2, r = 12$

Half yearly ⇒ $A = 8000\left(1+\frac{6}{100}\right)^4$

Quaterly ⇒ $A = 8000\left(1+\frac{3}{100}\right)^8$

Monthly ⇒ $A = \underset{8000}{P}\left(1+\frac{1}{100}\right)^{24}$

Ex-① Amit invested Rs 8000 for 3-year at 5% compound interest in a post office. If the interest compounded once in a year then find compound interest -

(a) 926/ (b) 1161 (c) 126/ (d) 136/

Sol^n :- $A = P(1+r/100)^n$ ⇒ $8000\left(1+\frac{5}{100}\right)^3 = 8000 * \frac{105}{100} * \frac{105}{100} * \frac{105}{100}$

$= 9261$

$\therefore C.I = 9261 - 8000 = 1261$ Ans

Ex ② A sum of money ₹ 2000 invested for 1½ year of compound interest at 10% p.a. If compound half yearly then find C.I.

soln:- $r = r/2 = 10/2 = 5\%$. $T = 2*T = 3/2*2 = 3$ year.

$\Rightarrow CI = P*\left(1+\frac{r}{100}\right)^n - P$

$= 2000*\left(1+\frac{5}{100}\right)^3 - 2000$

$= 315.25$ Ans

Ex ③ → find the compound interest on the 25000 in 2-year the rate of interest being 5% for the 1st year and 10% for the 2nd year.

soln ⇒ $C.I = P*\left(1+\frac{r_1}{100}\right)^{1st}\left(1+\frac{r_2}{100}\right)^{2nd}\cdots\left(1+\frac{r_n}{100}\right)^{nth}$

$= 25000\left(1+\frac{5}{100}\right)\left(1+\frac{10}{100}\right) - 25000$

$= 3875$ Ans

Ex: ④ Find C.I. as Rs = 12000 at 10% per A. for 2-year and 6-month

soln: ⇒ $CI = 12000*\left(1+\frac{10}{100}\right)^2*\left(1+\frac{5}{100}\right) - 12,000$

$= 12000*\frac{110}{100}*\frac{110}{100}*\frac{105}{100} - 12000$

$= 3246$ Ans

Ex → ⑤ At what rate percent per annum compound interest will Rs = 6250 amount Rs 6760 in 2-year —

soln: ⇒ $A = P*\left(1+\frac{r}{100}\right)^n$

$6760 = 6250\left(\frac{100+r}{100}\right)\left(\frac{100+r}{100}\right)$

$6760 = 6250\left(\frac{100+r}{100}\right)\left(\frac{100+r}{100}\right)$

$\Rightarrow \frac{6760}{6250} = \left(\frac{100+r}{100}\right)^2$

$\left(\frac{26}{25}\right)^2 = \left(\frac{100+r}{100}\right)^2$

take root $\Rightarrow \frac{26}{25} = \frac{100+r}{100}$

$\therefore 2600 = 2500 + 25r$

$\Rightarrow r = 4\%$. Ans

UNIT - 2 PARTNERSHIP

* Two or more person togither do some business is called partnership.

these person are called partner.

Two kind of partner shif -

(1) Simple Partnership.

(2) compound ..

(1) **Simple Partnership :-** all the partners invest their capital for same period of time.

⇒ **Ratio of Profits = ratio of capitals.**

Ex: A = 2000, B = 3000 } year ⇒ Total profit = 2500

A : B = 2000 : 3000 = 2 : 3

total Ratio = 5

Profit of A = $\frac{2}{5} * 2500$ ⇒ 1000.

B = $\frac{3}{5} * 2500$ ⇒ 1500. /-

(2) **compound partnership :-** All partners invest their capital for different period of time.

⇒ **Ratio of Periods = Ratio of product and time period.**

Ex: A = 2000 = 1 year Total profit = 3500

B = 3000 = 6 month

A : B = 2000 * 12 : 3000 * 6

= 24000 : 18000

= 4 : 3

∴ A's profit = $\frac{3500}{7} * 4 = 2000$

B's = 1500

Two kinds of partners —

(1) Active partners
(2) sleeping partners.

→ Active partners = profit + salary (Actual investing + working) / loss

Ex (1) sleeping → only profit / loss ← these only do investing.

Ex (1) A started a business with ₹ = 20,000 · After 4-months B-join with ₹ 25,000, After 2 more month C-join, with 15,000 · At the end of 10-month 'C' received ₹ = 4,200 as his profit then what is total profit.

sol": A : B : C = 20,000 * 10 : 6 * 25000 : 4 * 15000

= 20 : 15 : 6.

∴ let total profit = x

∴ C's profit => $\frac{x * 6}{41} = 4200$

$x = \frac{4200 * 41}{6} = 28,700$ Ans

Ex (2) A and B started a business with capitals Rs = 10,000 and ₹ 9000 · After 6-month A invest ₹ 3000 more. After 8 month B - withdraw ₹ 3000 then C-join with 5000 find profit of A. If total profit is 5715 at the end of year.

=> A : B : C = (10,000 * 6 + 13000 * 6) : (9000 * 8 + 6000 * 4) : 5000 * 4

= 69 : 48 : 10

∴ A's profit = $\frac{5715 * 69}{127} = 3105$ Ans

Ex: A, B, C started business with a capital of 59,000 A invest ₹ 6000 more than B and B invest ₹ =6000 less than C. If the total profit at the end of a year is ₹ =11,800 then profit of 'C'.

Soln:- Let C invest = x

B = x-6000

A = x-6000+8000

∴ A+B+C = 59,000

x+6000+8000+x-6000+x = 59000

3x = 63000

x = 21000/-

So A invest = 23000/-

B = 15000/-

C = 21000/-

∴ A : B : C = 23000 : 15000 : 21000

= 23 : 15 : 21

∴ C's profit = $\frac{11,800 \times 21}{59}$ = 4200

Ex: (4) A and B started with Rs 30,000 and Rs 240000 At the end of year they recieved Rs 16000 each. If B has sleeping partner then annual salary of A.

Soln:- A → Active → 16000 → salary + profit

B → 16000 → only profit

A : B = 3 : 4

Let's total profit = x

A's profit = $\frac{3x}{7}$

B's profit = $\frac{4x}{7}$ = 16,000.

$\Rightarrow x = \frac{16000 \times 7}{4}$ $\Rightarrow$ 28000/-

So salary of A = Actual profit

= 16000 − 12000 = 4000/-

II - Direct

A : B = 3 : 4

A → Actual 16000 → profit + salary

B = 1600 only profit

4000 4000 4000 4000

A

4000 4000 4000 = 12000

∴ salary = 16000 − 12000 = 4000 Ans

III

4 part = 16000

3 part = ? (x)

profit of A = 3/4 of 16000 = 12000

∴ salary = 4000

Ex (5) A and B enter into a partnership with capitals of ratio 5:8. At the end of 8-months. A withdraw from the business. If their profits are in the ratio 1:2 How long B invest his capital - (a) 6-months (b) 8-months (c) 11- " (d) 10-months

⇒

capital	time	profit
5 : 8	A = 8	A : B = 1 : 2
A = 5	B = x	40 : 8x = 1 : 2
B = 8		x = 10

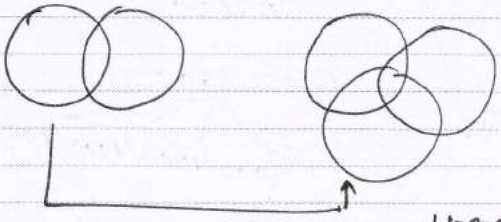
A : B = 40 : 8x

① Circle diagram (pie chart)

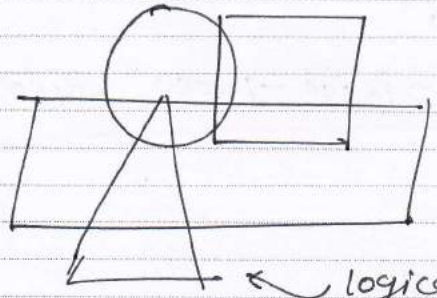
② Bar –

③ Graph

④ Table

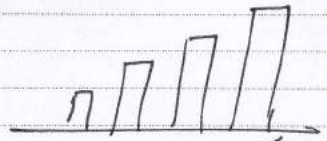


venn-diagram.



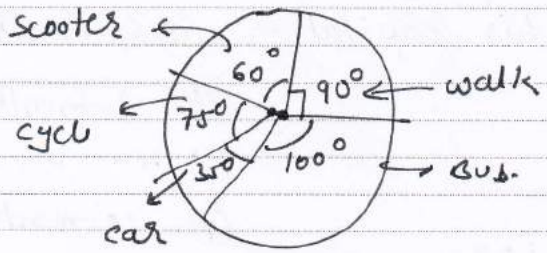
← logical diagram.

→ pie chart



← Bar chart

⇒ Circle diagram or pie chart



Given: Total people = 1800.

4 - mode of transport

Total people = Total angle = 360°

car = 360 - 325 = 35°

① Percentage of scooter to cycle:

(a) 60%. (b) 80%. (c) 25%. (d) 40%.

$$\text{Scooter} = \frac{\text{scooter}}{\text{cycle}} \times 100 = \frac{60}{75} \times 100 = 80\%.$$

(2) Increasing % of scooter to the cycle –

(a) 20% (b) 40% (c) 25% (d) 60%

scooter → cycle

$60^\circ \rightarrow 75^\circ$

15°

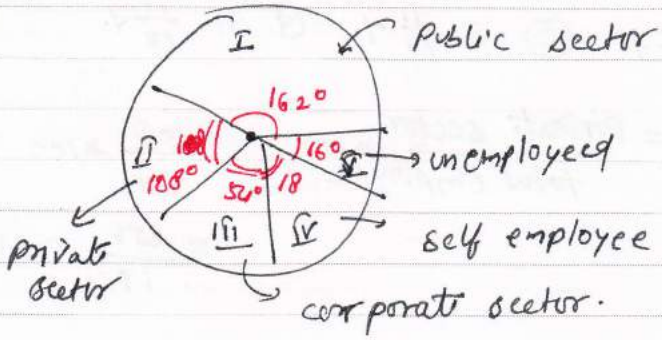
$\therefore$ Increasing % $= \frac{15}{60} \times 100 = 25\%$

(3) % of scooter = (a) 16% (b) 16.66% (c) 26.66% (d) 6.66%

$= \frac{\text{scooter angle}}{\text{Total angle}} \times 100$ 'or' $\frac{\text{scooter people}}{\text{Total people}} \times 100$

$= \frac{60}{360} \times 100 = 16.16\%$ | $\frac{300}{1800} \times 100 \Rightarrow 16.66\%$

Ex (4)



Given Total population = 5000

Total angle = 360°

different sector of employe =

Total employee $= 360 - 18 = 342^\circ$

(1) what % of employed person is self employed –

(a) 5% (b) $5\frac{5}{19}\%$ (c) 19% (d) 20%

(2) (d) $\frac{\text{self employee}}{\text{total employee}} \times 100 = \frac{18}{342} \times 100 = 5\frac{5}{19}\%$

% of self employee person

$\Rightarrow \frac{\text{self Employee}}{\text{Total employee}} * 100 = \frac{10}{360} * 100 \Rightarrow 5\%$

(2) The # of persons employed in both the public sector and corporate sector is -

(a) 3200 (b) 2700 (c) 3000 (d) 3600

Angle $= 162 + 54 = 216^0$

$360 = 5000$

$216 = \frac{5000}{360} * 216 = 3000$ Ans

(3) what % of the employee person is employed in private sector -

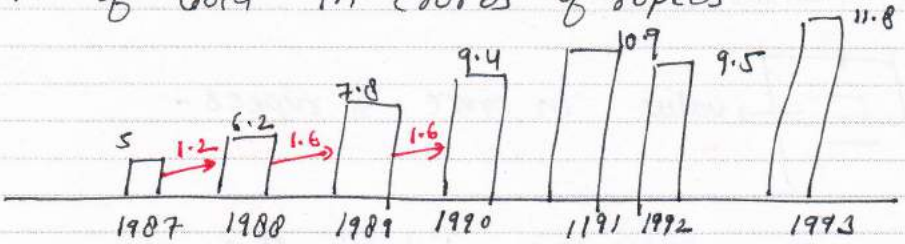
(a) $15\frac{5}{19}\%$ (b) $31\frac{12}{19}\%$ (c) $31\frac{11}{19}\%$ (d) $31\frac{11}{19}\%$

$= \frac{\text{private sector}}{\text{total employee}} * 100 = \frac{108}{342} * 100$

$= \frac{650}{19} = 31\frac{11}{19}\%$ Ans

DIRECTION FOR DIRECTION

→ Export of Gold in crores of rupees -



① In which year there was maximum increase in export of gold to that in the previous year -

(a) 1987 (b) 1988 (c) 1989 (d) 1990

→ find maximum increase
find increasing %.

1988 over 1987 = $\frac{1.2}{5} \times 100 = 24\%$.

1989 over 1988 = $\frac{1.6}{6.2} \times 100 = 25.8\%$.

1990 over 1989 ⇒ $\frac{1.6}{7.8} \times 100 = 24.25\%$.

1991 over 1990 = ——

② In How many year was the export above the avg for the given period. (a) 2 (b) 3 (c) 4 (d) 5

→ Avg = $\frac{5 + 6.2 + 7.8 + 9.4 + 10.9 + 9.5 + 11.8}{7}$

$= \frac{60.6}{7} = 8.6$.

so above avg = 4-year ⇒ (1990 to 1993)

below avg = 3 year = (1987 to 1989)

equal avg = 0 year. (zero coz b/w 1989 to 1990)

③ Increasing % from 1992 to 1993 -

(a) 16.2% (b) 24.2% (c) 25.2% (d) 18.2%

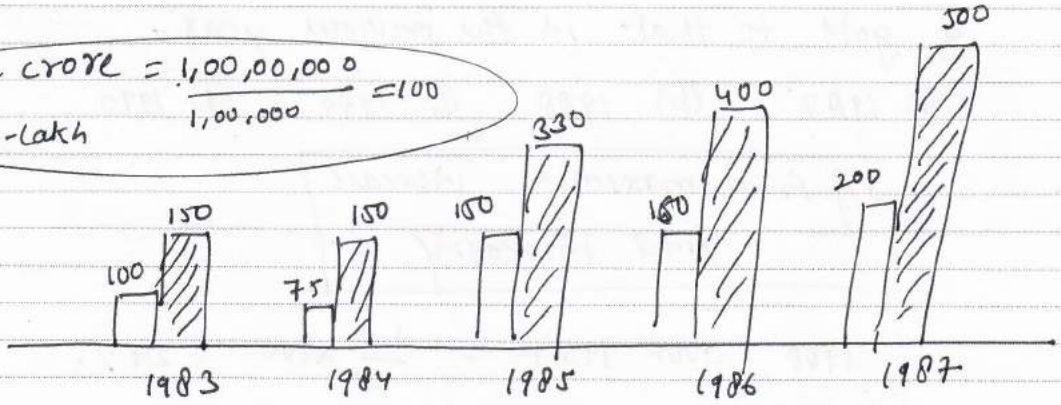
increasing = $\frac{2.3}{9.5} \times 100 = 24.2\%$.

India's Biscuit Exports -

= → value in crore of rupees -

□ → quantities in lakh this -

1 crore = 1,00,00,000 / 1,00,000 = 100
1 lakh



100 Lakhs of this = 150 crores

value of 1 this = 150/100 = crore/lakh

= (150 × 1,00,00,000) / 100,100000

⇒ 150

(I) In which year the value per this will be minimum. -

(a) 1983 (b) 1984 (c) 1985 (d) 1986

1983 → 150/100 ×100 = 150

1984 → 150/75 ×100 = 200

1985 → 330/150 ×100 = 220

1986 → 400/180 ×100 = 250

1987 → 500/200 ×100 = 250

(2) What was the approximate % increase in export value in from 1983 to 1987 (a) 100 % (b) 233.33 % (c) 333.33 %

(d) none

→ 1983 1987

150 → 500

350

$\Rightarrow \frac{350}{150} \times 100 = 233.33\%$.

(13) If in 1986 the tins were ~~exported~~ exported at the ~~same~~ same rate as in 1985 what the value in crore of rupees of export in 1986 -

(a) 48 (b) 352 (c) 362 (d) 372

1986 | 1985

160 lakhs $\Rightarrow \frac{330}{150} \times 100 = 220$

1,60,000 00 × 220

$\Rightarrow$ 352,00,00,000/-

⇐

Ex:① Ashish is ~~heavy~~ heaviour than Govind. Mohit is lighter than jack. pawan is heaviour than jack but lighter than Govind
Among them is the heaviest

ⓐ Govind
ⓑ Jack
ⓒ Pawan
ⓓ Ashish.

Sol^{n} ⇒ G < A
M < J
J < P
P < G ①
M < J < P < G < A

Ex② five Boys take part in Race. Raj finished before Mohit but behind ~~Gaurav~~ Gaurav. Ashish finished before Sanchit but behind Mohit –
who won the Race

⇒ M → R | S → A
R → G | A → M

ⓐ Raj ⓑ Gaurav ⓒ Mohit ⓓ Ashish

Sol^{n}: S → A → M → R → G

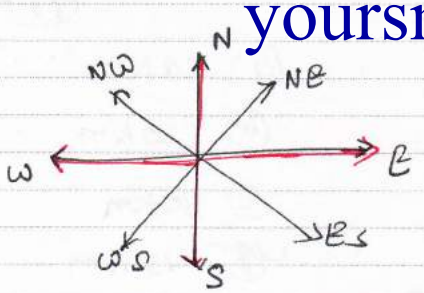
Ex → ③ A row of 21-Girls; when monika shifted by four places towards the Right. she become 12th from the left and her earlier position from the right end of the row.

ⓐ 13th
ⓑ 14th
ⓒ 11th
ⓓ 9th

1 2 3 4 5 6 7 (8 M) 9 10 11 (12 M) 13 14 15 16 17 18 19 20 21

from the right end = 14th

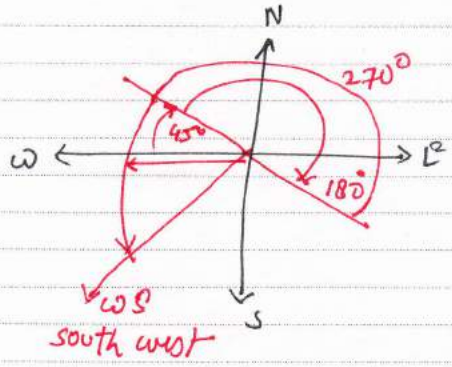
left Right
A B C --- X Y Z
③ ⑤



⇒ Ex-① A man is facing west. He turn 45° in clock wise direction and then anothis 180° in the same direction and and the 270° in the anti clock wise direction now -

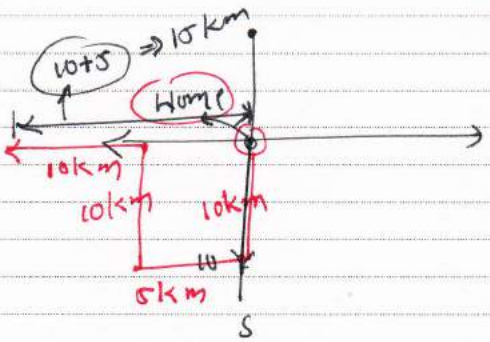
(a) South (b) North west (c) west (d) South west

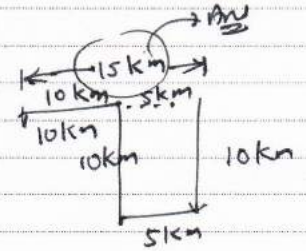
Soln.



⇒ Ex② one day Ravi left from home and cycled 10 km south wards. ; Turnd right and ~~cycled~~ cycled 5km and turned right and cycled 10 km and turn left and cycled 10km ; Now How many km minimum he need do cycle to reach home straight.

Soln:



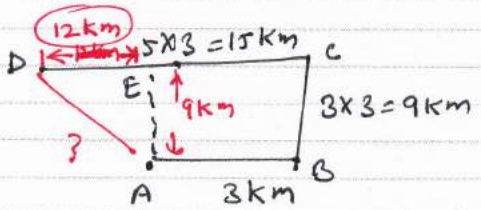


Ex③ A person start from a part A and travel 3 km East wards to point B. Then turn left are travel thrice that distance to reach on 'C'. He again turn's left and travel's five the distance he covered b/w A and B and reaches his destination point D. then the shortest

distance between starting point

(a) 10 km
(b) 20 km
(c) 30 km
(d) 15 km

Soln:



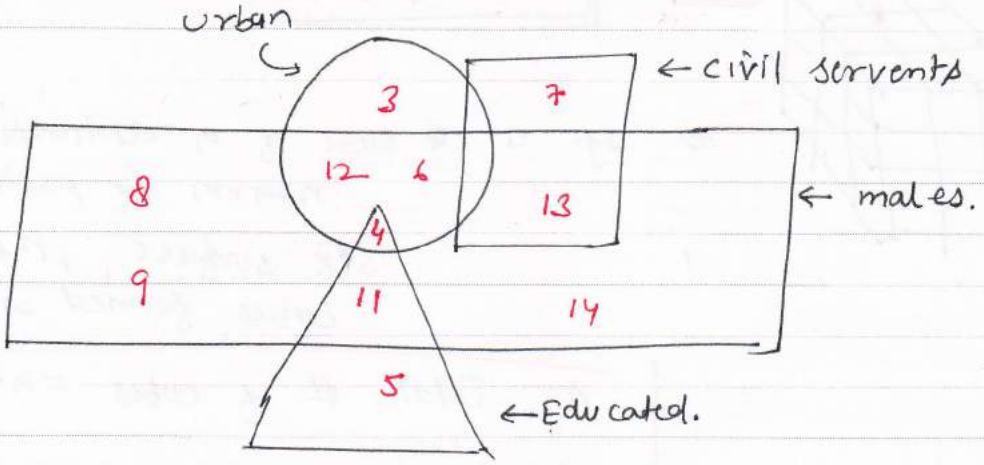
$AD^2 = \sqrt{AE^2 + ED}$

$= \sqrt{9^2 + 12^2}$

$= \sqrt{144 + 81} = \sqrt{225}$

$= 15$

~~LOGICAL VEN~~



(1) who a many the following is neither a civil servant nor educated but is urban and not a males.

(a) 2 (b) 3 (c) 6 (d) 10

(2) Who among the following is a female, urban resident and also a civil servant.

(a) 6 (b) 7 (c) 10 (d) 13

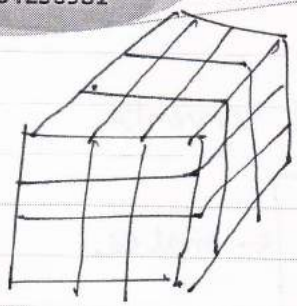
(3) Who among the following is an educated male who hails from urban area.

(a) 4 (b) 2 (c) 11 (d) 5

(4) Only male Represents.

(a) 8 (b) 9 (c) 14 (d) 8, 9, 14 (e) None.

UNIT - CUBES & DICES



⇒ If a cube of n dimension is painted on all six surface, then smaller cubes formed will have -

(1) Total # of cubes $= n^3$

(2) Total # of cubes painted on three sides = 8

(3) cubes painted on two sides $= (n-2) \times 4 \times 3$

(4) cubes painted ~~1 side~~ - single sides ⇒ $(n-2)^2 \times 6$

(5) cubes painted on no sides $= (n-2)^3$

~~Table~~ :-